CIMR Research Working Paper Series

Working Paper No. 27

An exploration of interactive contextual and dispositional factors which influence a collective process of entrepreneurial activity: a novel case at Bristol Zoo

by

Natalie Holden
Birkbeck, University of London
School of Business, Economics and Informatics
Malet Street, London WC1E 7HX

November 17 2015

ISSN 2052-06

Abstract

One of the central debates in entrepreneurship research is between contextual and dispositional approaches to explain entrepreneurial behaviour (Sørenson, 2007). This exploratory case study research takes a fresh approach by combining both - contextual and dispositional - perspectives and, further, investigates the interaction between the two. To do so, the research draws on several different literatures. The dimensions of context considered are the social, spatial, temporal and institutional (Zahra & Wright, 2011); the dispositional motivations include self-efficacy, independence, and drive (Shane et al., 2003).

The case itself represents an example of collective entrepreneurial behaviour amongst individual representatives from diverse organisations including Toshiba, the University of Bristol, the Wildscreen charity, and BBC R&D, as well as companies associated with a more traditional firm-founding view of entrepreneurship - ProVision (a University of Bristol spin-off) and VID Communications (a newly established media consultancy). Funded by government-backed Innovate UK, this enterprising consortium collaborated to deliver a novel product: an innovative Audio-visual Wildlife Experience at Bristol Zoo.

Key words Entrepreneurial Innovation, Entrepreneurial Context, Entrepreneurial Motivation, Innovation Systems, Innovation Policy

JEL codes: O30 Innovation (General), O31 Innovation and Invention: Processes and Incentives, O32 Management of Technological Innovation and R&D, O38 Government Policy

Acknowledgements

This paper is based on a dissertation completed under the supervision of Professor Helen Lawton Smith at Birkbeck, University of London in partial fulfilment for the requirement of MSc in Management and Business Innovation.

1. Introduction

1.1 Entrepreneurial Behaviour: Contextual versus Dimensional Explanations

'The study of entrepreneurship has a bifurcated history – typically focusing on either individuals or environments but not linking the two' (Thornton, 1999). In the 1980s, key scholars in the field of entrepreneurship delivered a resounding - and well-founded (Shane et al., 2003) - criticism of the existing empirical research on the role of human motivation in entrepreneurship (Aldrich & Zimmer, 1986; Gartner, 1988). Perhaps as a consequence, recognition of the role of agency (Sarasvathy, 2008) in entrepreneurial activity was put aside and subsequent research focussed instead on contextual and environmental characteristics influencing entrepreneurial behaviour (Aldrich, 1999). More recently, however, some scholars have contended that 'weak evidence for dispositional explanations does not constitute strong evidence for contextual arguments' (Sørenson, 2007) and there has been a renewed interest in the long-neglected dispositional motivations of people making entrepreneurial decisions. Some scholars now go so far as to claim that this is vital for the development of entrepreneurship theory (Shane, Locke & Collins, 2003).

In recognition of the renewed interest in the individual motivations influencing entrepreneurial behaviour - but also heeding Aldrich's somewhat forceful observation that 'personal traits, taken out of context, simply do not explain very much' (Aldrich, 1999: 76) - this research takes a fresh approach by attempting to combine the two - contextual and dispositional - perspectives. The research is complicated because it necessarily draws on several literatures and challenging owing to the largely underdeveloped literature on dispositional entrepreneurial behaviour. Nonetheless, this is a rare qualitative case study considering both environmental and individual influences on entrepreneurial activity and offers an opportunity to understand, in context-specific detail, the 'nature, richness and dynamics' (Zahra, 2007) of entrepreneurial behaviour. What follows in this introduction is a broad outline of the contexts and dispositional traits which will be the focus of this research; the research aim; an introduction to the specific case which is the focus of the study; and, finally, the research question.

The conceptual importance of studying the context of entrepreneurial activities is widely recognised (Shane & Venkataraman, 2001). It is, however, perhaps a little ironic - given that proponents of the contextual approach were so dismissive of the *empirical work* on dispositional explanations of entrepreneurial activity (Aldrich & Zimmer, 1986; Gartner, 1988; Thornton, 1999) - that in recent years the *empirical treatment of context* in entrepreneurship research is coming under criticism from a new generation of scholars (Zahra & Wright, 2011; Welter, 2011; Autio et al., 2014; Foss et al., 2013).These scholars argue that contextual influences on entrepreneurial behaviour have overwhelmingly been seen as control variables instead of 'part of the story' (Zahra & Wright, 2011). They lament that, as a consequence of the dominant approach in the field seeking 'general laws' of entrepreneurship which might transcend context, entrepreneurship research has been deliberately 'decontextualised' (Hjorth et al., 2008). These scholars argue that a substantive shift is required to address the heterogeneity of contexts in which entrepreneurial activities take place, a shift which is fundamental to both expand the field's contribution as a scholarly discipline, and to influence managerial practice and public policy (Zahra & Wright, 2011). Yet despite the pressing calls for contextualisation there is, at present, no 'widely cited categorization' (Autio et al., 2014) of contextual influences on entrepreneurship[1]. This research will therefore focus on the four contextual dimensions which were put forward by Zahra & Wright (2011) which were, in turn, chosen based on the frequency of their appearance in previous studies. These four contextual dimensions are: social, spatial, institutional and temporal. Each of these contexts will be addressed in the literature review.

Contexts are held to 'pervade and influence' the microprocesses of entrepreneurial action (Zahra et al., 2014). However, studies by entrepreneurship researchers into the microfoundations - the individual motivations, perceptions, desires, cognition and judgement (Abell et al., 2008) - of entrepreneurial behaviour are few and far between.

[1] Perhaps because entrepreneurship as a field lacks a coherent, integrative framework (Sarasvathy & Venkataraman, 2011), there is an impression that scholars have been more able to 'pick and choose' (Zahra et al., 2014) contextual variables which they found interesting, resulting in burgeoning lists of variables.

Shane et al.'s 2003 intervention to encourage consideration of dispositional motivations affecting entrepreneurial behaviour was highly significant. To further this process, Shane et al. (2003) proposed a 'roadmap' for future research into individual entrepreneurial motivations. Research into the dispositional accounts of entrepreneurial behaviour in this study will therefore use as its basis Shane et al. (2003)'s roadmap of major motivations which include self-efficacy (Bandura, 1997), independence (Hornaday & Aboud, 1973) and drive (Shane et al., 2003). These motivations will be discussed in the literature review. Unlike Shane et al. (2003), however, who explicitly consider environmental factors to be 'held constant', this research specifically explores the interaction between the environmental and dispositional influences on entrepreneurial behaviour.

1.2 Research Aim, Case Outline & Research Question

Shane at al., (2003) are explicit in their approach to dispositional motivations as independent 'motivational variables'. But what is perhaps surprising - in light of their criticism of earlier contextual research as 'decontextualised' (Hjorth et al., 2008) - is that those scholars who call for a recognition of the context-dependent nature of entrepreneurship (Autio et al, 2014; Acs et al, 2014; Foss, Lyngsie and Zahra, 2013; Welter, 2011) also tend to discuss contexts independently as 'contextual *variables*' (Zahra et al., 2014); little attention is paid to the interaction between the contexts. A likely reason for this is that entrepreneurship research has predominantly been quantitative, tending towards an over-reliance on mail surveys matched by a dearth of field studies (Zahra & Wright, 2011), making true contextualisation difficult. This case study research therefore attempts to do four things in its investigation of entrepreneurial activity and behaviour. First, it explores entrepreneurial behaviour in relation to the four contextual dimensions put forward by Zahra & Wright (2011); second, it examines the interrelated and interactive nature of these four contextual dimensions; third, it investigates dispositional motivations as put forward by Shane et al., (2003); and finally it considers the role played by individual motivations in relation to these contextual dimensions. In short, this research explores how *interactive* contextual and dispositional factors influence the process of entrepreneurial activity.

This research draws on the entrepreneurship literature, but the case itself specifically addresses entrepreneurial *behaviour* and entrepreneurial *activity* as opposed to entrepreneurship in the more traditional sense of firm-founding; as Shane & Venkataraman (2000) have explained, entrepreneurs are not required to be viewed solely as the founders of new organisations.[2] The case for this research is a collaborative innovation project which took place in Bristol from May 2011 to October 2014. The project was an Audio-visual Wildlife Experience called 'Arkive in your Pocket' (AIYP, pronounced 'Ape') which was trialled at Bristol Zoo. The project came about in response to a funding call from the government-backed Innovate UK[3] for projects which aimed to improve 'cooperation between infrastructure providers, content producers, users and software developers' (Innovate UK, 2011). Part-funded by Innovate UK, the project brought together an interdisciplinary consortium of specialists from domains including natural history, creative technology, wireless communications, interactivity and mobile phone application development.

Although including some independently founded firms in the traditional sense of entrepreneurship, the wider team comprised diverse partners from the University of Bristol (UoB), 3CR (UoB research and technology transfer office), VID Communications (independent media consultancy), Wildscreen (charity), BBC R&D, Toshiba Labs, Mubaloo (digital agency) and ProVision (UoB spin-off). Each organisation in the consortium was represented by a single individual who, in some instances, were supported by other colleagues from within their respective organisations. To deliver an innovative Audio-visual Wildlife Experience for visitors to Bristol Zoo in October 2014, these representative individuals displayed enterprising ways of behaviour - not least in leveraging government funding for this creative outcome. The research question is therefore, *how do*

[2] This is consistent with several classical definitions of entrepreneurship, not least Schumpeter (1942), McClelland (1961) and Kirzner (1973). Conversely, Peter Drucker has also argued that not every new and small business represents entrepreneurship (Drucker, 1985).

[3] Innovate UK is a public body sponsored by the Department for Business, Innovation and Skills, tasked with finding and driving the science and technology innovations that will grow the UK economy (Innovate UK website, 2015). It changed its name from the Technology Strategy Board (TSB) in August 2014. Any reference to TSB in this research – including by interviewees – has been changed to Innovate UK for consistency.

key interactive contextual and dispositional factors interact to influence a collective process of entrepreneurial activity?

2. Literature Review

The literature review is in two parts. The first and longer section addresses the contextual influences on entrepreneurial activity and is structured around the four overarching contextual dimensions put forward by Zahra & Wright (2011): social, spatial, institutional and temporal. Under each wide-ranging dimension, particular strands of literature have been selected based on their pertinence to the study according to existing knowledge of the case; the prior knowledge guiding these choices will be presented at the beginning of the discussion around each context. By selecting the literature in this way, it is therefore anticipated that the review of the contextual dimensions should reveal likely areas of interactivity between the four. The latter section (beginning 2.5) considers dispositional motivations using as its basis Shane et al. (2003)'s roadmap of major motivations. The section concludes with a summary and presentation of the research framework which is used to explore the interactivity between the interrelated contexts and dispositional motivations.

2.1 Social Context

According to Welter (2011), 'The most popular application of social context in entrepreneurship research refers to social network approaches'. Social networks are broadly defined by a set of actors and a set of linkages between the actors (Brass, 1992). In the case of the AIYP project, many of the consortium partners were already known to each other and in some cases had long-standing relationships. The network analysis literature has investigated the structure of such relations between actors and how patterns within social structures can influence a variety of outcomes (Wasserman & Faust, 1994). These measures can also be applied to the entrepreneurial process. There is extensive literature on entrepreneurs' social networks (Davidsson & Honig, 2003) and entrepreneurs' networks are recognised to be important for opportunity recognition (Hills et al., 1997).

The following measures and ties identified by the network analysis literature have been found to be particularly relevant to the entrepreneurial process. Network size and centrality measure the *amount* of resources an entrepreneur can access through the number of direct links between herself and other actors (Aldrich & Reese, 1993), as well as resources that can be reached indirectly through intermediaries (Brajkovish, 1994). These networks can be interconnected and clustered as actors in particular nodes in the network may also know each other from other networks (Ulhøi, 2005). Granovetter's (1973) classic article highlighted the value of 'weak ties' when it came to accessing a *diversity* of resources, where 'weak ties' act as bridges to other disconnected social groups. His work was taken up by Burt (1992) who emphasized that - whether weak or strong - the most valuable ties were those that spanned 'structural holes' (the gap between two disconnected social groups). Empirical research has shown that entrepreneurs who have dense networks 'identify significantly more opportunities' (Hills et al, 1997).

Networks are recognised as a key source of information and resources (Stuart & Sorenson, 2007). A large social network is valuable because knowledge is dispersed among different individuals, gained from their specific experiences (Hayek, 1945)[4]. Yet a large network of human knowledge sources in itself is not sufficient, for the entrepreneur must also be 'alert' (Kirzner, 1973) to these opportunities. Von Hippel (1994) observed that people notice information that is related to information they already know; it has therefore been asserted that entrepreneurs will identify opportunities because prior knowledge provokes recognition of the value of the new information (Shane, 1999). This interplay between social networks, prior knowledge and the entrepreneur's alertness to possible opportunities can be summarised thus:

The ability of the entrepreneur to search within and across sources of knowledge is determined by the size and heterogeneity of his/her networks; the greater the heterogeneity

[4] Kirzner (1985) coined the phrase 'knowledge corridor' for this idiosyncratic knowledge between individuals.

of social ties and past knowledge and experience, the more creative will be the entrepreneur (Leyden, Link & Siegel, 2014).[5]

An interesting qualitative study by Sigrist (1999) suggests there are in fact two types of past knowledge and experience: professional knowledge - which has been accumulated over a number of years by working in a particular job (Domain 2) - and knowledge that has come about as a result of a personal interest in a particular area which is described in terms of fascination and fun (Domain 1). She argues that alertness is increased when these two domains converge.

When it comes to facilitating knowledge exchange, and particularly tacit knowledge exchange (Polanyi, 1966; Nonaka & Takeuchi, 1995), research has revealed the importance of personal relationships of trust-based character. This trust is a critical element of network exchange (Larson, 1992). It affirms that each partner believes in the other's reliability to fulfil their respective obligations and in turn acts as a governance mechanism undergirding the exchange network (Pruitt, 1981). Freel (2000) notes the importance of personal contacts with adjacent firms in the diffusion of knowledge from universities. A similar finding is made by Perkmann & Walsh (2007) whose study highlights the role of relationship-links (rather than transactional market links) in the context of university-industry open innovation. Although many organization-level relationships may come about as a result of formally established inter-organisational arrangements, such as R&D alliances (Hagedoorn et al. 2000), inter-organisational affiliations can also often be based on social relationships between individual organisational members (Oliver and Liebeskind, 1998). Reaching out to available social contacts is not only convenient (Forbes et al, 2006) but also assures interpersonal trust (Greve and Salaff, 2003).

[5] These are 'the underlying seedbeds - i.e. the knowledge contexts - from which innovative new ventures arise' (Agarwal & Shah, 2014).

2.2 Spatial Context

As the AIYP project was a Bristol-based project, consideration of the spatial influences which might affect entrepreneurial activity will be limited to a local context.[6] The co-location of partners would suggest a high level of interaction between the social and spatial contexts. Social research in networking has long established that geographic proximity is perhaps the most important determinant of social relationships (Festinger, Schacter & Back, 1950) implying greater opportunities for unscheduled face-to-face encounters for trust development (Maskell et al., 1998).

Being in close proximity to innovation partners is generally viewed to be particularly important for novel innovators (Baptista & Swann, 1998; Nooteboom, 1999); the more complex the learning process, the more interactions are likely to be required (Johnson & Lundvall, 1993) in order to exchange the new and tacit knowledge. However, interestingly, a study by Freel (2003) revealed that

*Novel innovators (i.e. those introducing products or processes new to the industry) are marked by the greater geographical reach of their innovation networks, whilst incremental product innovators appear to be more locally embedded. (*Freel, 2003: 767)

This raises a paradox when it comes to entrepreneurial opportunity identification. Freel (2003)'s study suggests that that 'the probability that local ties can offer all complementary resources is low' (Oerlemans et al., 2001: 4), yet it has also been shown how entrepreneurs use their social networks - which inevitably concentrate in the region in which they work and live (Stuart & Sorenson, 2005) - as a source of valuable new knowledge and opportunities. Could it be that in instances of novel innovation in a regional context, entrepreneurs are more creative in their combinations of the knowledge and resources they

[6] Delineating the boundaries of a local region or community is not straightforward. In this case, Marquis & Battilana (2009)'s definition is used: 'the populations, organizations, and markets located in a geographic territory and sharing, as a result of their common location, elements of culture, norms, identity and laws'.

have to hand? This suggestion seems to be bolstered by a recent article by Agarwal & Shah (2014) in which they proposed that

Regional economic growth [through innovation] might be most robust when multiple knowledge sources are in place and insights from various sources can co-mingle: users for insights that trigger the creation of new products [...]; universities for the development of technological knowledge [...]; and existing firms for the transfer of operational knowledge. (Agarwal & Shah, 2014)

The relational interactions between regional firms, universities and individuals which enable such 'co-mingling' can be supported through formal institutional initiatives. Local public authorities can play an important enabling role through a range of regulative pressures as well as by creating administrative bodies to facilitate such interactions (Marquis & Battilana, 2009). Universities in particular have been found to play a key role in shaping the institutional environment at the community level (Amin & Thrift, 1992), helping to shape knowledge networks and promote innovation among local firms. This local-level interaction between different actors from firms and other institutions including universities, industry organisations and government agencies has been described as a 'Regional System of Innovation' (RSI) (Cooke et al., 1997; Braczyk et al., 1998). As a framework for nurturing innovation processes, the RSI concept emerged from the highly influential National System of Innovation (NSI) concept (Freeman, 1987; Lundvall, 1992; Nelson, 1993). Despite increasing academic interest in RSIs, the NSI approach remains the dominant framework (Howells, 2003) and will be discussed in detail in the following section.

2.3 Institutional Context

The institutional context covers everything from the formal laws around IP protection (Andersen, 2003) to informal 'norms and culturally-based systems of interpretation' (Lundvall, 1992), but the particular area of focus in this section is the institutional *policy* context. The reason for this is because the AIYP project was funded by

Innovate UK, a public body sponsored by the Department for Business, Innovation and Skills, tasked with finding and driving the science and technology innovations that will grow the UK economy (Innovate UK website, 2015). To appreciate the role of Innovate UK, it is necessary to understand the 'National Systems of Innovation' (NSI) concept from which it emerged. The RSI model was briefly discussed in 2.2 but will now be considered from the broader spatial context - the national level.

The concept of a 'National System of Innovation' has provided an invaluable insight into the importance of thinking of innovation interactively as a complex, systemic and non-linear process (Freeman, 1987; Lundvall, 1992; Nelson, 1993). Although exact definitions can differ, the central tenet of the SI approach is that innovation does not happen in isolation; the interactive learning which leads to innovation is embedded within a wider framework 'constituted by elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge' (Lundvall 1992). This position is emphasized by K. Smith, who authored the OECD methodological manual on measuring innovation and who wrote that, 'The overall innovation performance of an economy depends not so much on how specific formal institutions (firms, research institutes, universities, etc.) perform, but on how they interact with each other' (Smith, 1995: 72). A key criticism of the NSI literature, however, is that this 'structuralist mode of explanation' (Lundvall, 2007) has meant that individual-level agency and the microprocesses of entrepreneurial innovation have been largely overlooked (Autio et al, 2014); 'enterprise has become the forgotten element in the innovation systems story' (Metcalfe & Ramlogan, 2008)[7].

[7] Of the emergence of the SI approach, Lundvall wrote that in the transition from his early Mark I model of individual entrepreneurship (Schumpeter, 1934) to the 'cooperative' entrepreneurship and routinised innovation of Mark II, (Schumpeter, 1942), Schumpeter set in motion the trajectory which led to a systemic approach to thinking about innovation (Lundvall, 1992). Given the clear Schumpeterian influence, it is particularly surprising that the individual entrepreneur has remained conspicuously absent from the NSI literature.

NSI as a concept emerged simultaneously in academia and policy circles[8] (Sharif, 2006) and has heavily influenced policy-making (Godin, 2009).[9] National governments engage in innovation policy because of the assumption that innovation is a key element in national economic growth (Lundvall, 1992). Innovate UK came about as a direct result of this NSI-prompted shift in policy. Funding provided by public bodies such as Innovate UK is recognised to play an important role in facilitating inter-organisational interactions. Public funding is often provided with the explicit purpose to maximise disclosure and spill-overs (Miotti et al., 2003), but has also been noted to have more indirect effects including positively influencing firms' R&D spending (Miotti et al. 2003) and propensity to co-operate in R&D (Veugelers, 1997). Despite these recognised positive effects, the same criticism of the theoretical NSI approach has also been levelled at studies of the role of the policy-makers advancing systems of innovation which is that these have 'largely overlooked [...] the motivations and organisational capacities that drive and constrain individual actors' (Gustafsson & Autio, 2011).

2.4 Temporal Context

The importance of the temporal dimensions of entrepreneurship is strongly acknowledged (Zahra, 2007). However, the literature relating to the role of time as an influence on entrepreneurship and entrepreneurial behaviour is highly fragmented (Zahra et al., 2014) and - given its diversity - has meant that any sort of systematic presentation is challenging. Furthermore, there is an additional difficulty specific to this context which is that prior knowledge of the AIYP project offers no sign-posts with regards to what aspects of temporal influence may have played an influencing role. What is outlined below is therefore a synthesis of a handful of general temporal factors which characterize the entrepreneurial process. It is an important context to consider as 'past experiences and understandings of the past form a backdrop against which present actions are taken leading

[8]Key proponents of NSI occupied roles in both academia and the OECD (Sharif, 2006).

[9] This is reflected in the shift from the unidirectional 'Science Policy' of the 1950s - 60s, through to the 'Technology Policy' (1970s - 80s) to the highly networked 'Innovation Policy' of the 1990s onwards.

to future wealth creation' (Bird & West, 1997). Entrepreneurs can learn from past experiences, and this learning - which increases and becomes clearer over time - can be distilled into new insights for future ventures (Zahra et al, 2000). Some scholars particularly emphasize this gradualness of this process, viewing opportunities as products of a synthesis of ideas over time (Dimov, 2007).

A recurring theme in the literature in relation to temporality is that of the 'life cycle'. One aspect is the organisational life cycle wherein the temporal dimension refers to the emergence of new ventures over time (Carter et al, 1996) with a focus on the entrepreneurial processes around establishing the venture: writing a business plan; securing the required funding and resources; marketing the product; building the product; and so on (Gartner, 1985). The other aspect is the industry life cycle as industries evolve from new to growth, maturity and decline (Autio et al, 2014). From an institutional perspective, policies, laws and regulations will change over time and, furthermore, the entrepreneurial ecosystem in which the entrepreneur operates is also constantly evolving with new clusters forming and dissolving (Feldman et al., 2005). Whilst life cycles and institutional changes could be regarded as long-term and evolutionary temporal influences on entrepreneurial activity, other factors have a more immediate and time-sensitive implication. Time defines the value and magnitude of opportunities (Short et al., 2010) and opportunity exploitation is time-based (Choi & Shepherd, 2004). Relating to this is the major risk for opportunistic entrepreneurs identified by Das & Teng (1997), which they refer to as 'the risk of missing the boat'. This notion of timeliness is particularly pertinent in the context of innovation that hinges on technology which is rapidly evolving, with products going 'out of date' even months after they are first produced.

2.5 Dispositional Influences on Entrepreneurial Behaviour

Early work on dispositional explanations of entrepreneurial activity was forcefully dismissed by proponents of the contextual approach to explain entrepreneurial activity (Aldrich & Zimmer, 1986; Gartner, 1988; Thornton, 1999). Recent work advocating contextualised entrepreneurship research has - perhaps as a result – minimal, if any,

mention of individual motivations influencing entrepreneurial behaviour. As this area has been neglected for so long, there is no clear framework for the study of the individual motivations in the entrepreneurial process. Moreover, existing research into the microfoundations which explicate the role of agency (Saravathy, 2008) draw from a diverse range of different disciplines from economics to psychology (Westhead, Wright &McElwee, 2011).

To aid future researchers navigating this miscellaneous literature, Shane et al. (2003) developed a roadmap of major entrepreneurial motivations which they identified from prior research. This section will therefore use this roadmap as the basis of the discussion. Six major entrepreneurial motivations from prior quantitative studies were identified by Shane et al. (2003) and three from prior qualitative studies. From this list of nine, motivations for which findings have proved to be ambiguous or those that have only been based on one or two studies have been excluded. The remaining motivations, which will be discussed below, are: (1) Risk Taking (2) Self-efficacy (3) Need for Achievement (4) Locus of Control (5) Independence and (6) Drive.

Particularly in the popular imagination, entrepreneurial behaviour is often associated with risk-taking behaviour (Drucker, 1970). However, the majority of prior studies cited by Shane et al. (2003) have suggested that entrepreneurs[10] do not in fact differ significantly from managers or the general population in terms of their risk-taking propensity (Low & Macmillan, 1988). Interestingly however, subsequent studies using interviews have shown that firm founders do in fact have a higher tendency to risk taking behaviour than managers or the general population, but did not themselves perceive these actions to be risky (Corman, Perles & Vancini, 1998). This has led to the suggestion that previous statistical findings may be confounded by high self-efficacy, which has also been identified as another motivation in its own right (Shane et al, 2003). Self-efficacy is an individual's belief in his or her capacity to exercise personal skills and and competencies to produce specific performance attainments (Bandura, 1997). A study by Baum & Locke

[10] Entrepreneurs here defined as firm owners for the purposes of the quantitative studies.

(2004) revealed that an entrepreneur's self-efficacy to grow their company had both a strong positive relationship with realised growth, and - amongst all of the variables considered in their study - self-efficacy was the single best predictor of this.

The remaining two motivators selected from the quantitative prior studies are the need for achievement (McClelland, 1961) and locus of control, the latter referring to the extent to which an individual believes that their actions will influence outcomes (Rotter, 1966). These are included in this discussion as both have received significant attention within the research domain of personal traits and entrepreneurship. However for both factors, quantitative studies have shown that although the firm founders display a stronger need for achievement and internal locus of control than does the general public, there was no real difference for either factor between firm founders and managers (Collins et al, 2000; Babb & Babb, 1992). These two factors will therefore not be considered in the research findings.

The final two motivators are independence and drive which have been selected for their frequent appearance in - largely - qualitative research. Perhaps unsurprisingly given the nature of the occupation, several studies have shown that firm founders have a strong desire for independence and also score much more highly on personality measures of independence than the general population (Hornaday & Aboud, 1973). Shane et al., (2003) themselves put forward the final motivator - 'drive' - to broadly refer to all of the aspects of ambition, persistence, energy and stamina which relate to the effort involved in turning an idea into a business. They suggest that there are two factors that sustain this effort - or drive - over long periods: 'One factor is high self-efficacy or task-specific confidence [...] The second factor is, strangely enough, love' (Shane, et al., 2003).

2.6 Summary

This literature review has discussed strands of literature which are specific to known aspects of the AIYP project case study[11]. This in itself is important as much of the criticism

[11] The exception here is the temporal context for which there was no project-specific prior knowledge.

of the empirical treatment of context in entrepreneurship research to date has been that it has not been 'part of the story' (Zahra & Wright, 2011). What is clear here is the significant interaction between the social and spatial contexts. Consideration of the institutional context was limited to the national level institutional policy; it may therefore be more helpful to think of the institutional context as one which is overarching.[12] Finally, the literature on the temporal context proved difficult to review as it was highly fragmented.

The second part of the literature review considered the dispositional motivations. This is crucial as much of the evidence impelling contextual arguments in sociological approaches to entrepreneurship 'does not adequately address the potential *alternative* explanations rooted in dispositional effects' (Sørenson, 2007). However, rather than thinking that contextual and dispositional influences could offer *alternative* explanations, the purpose of this research is to consider how the two aspects *interact* to influence entrepreneurial behaviour.

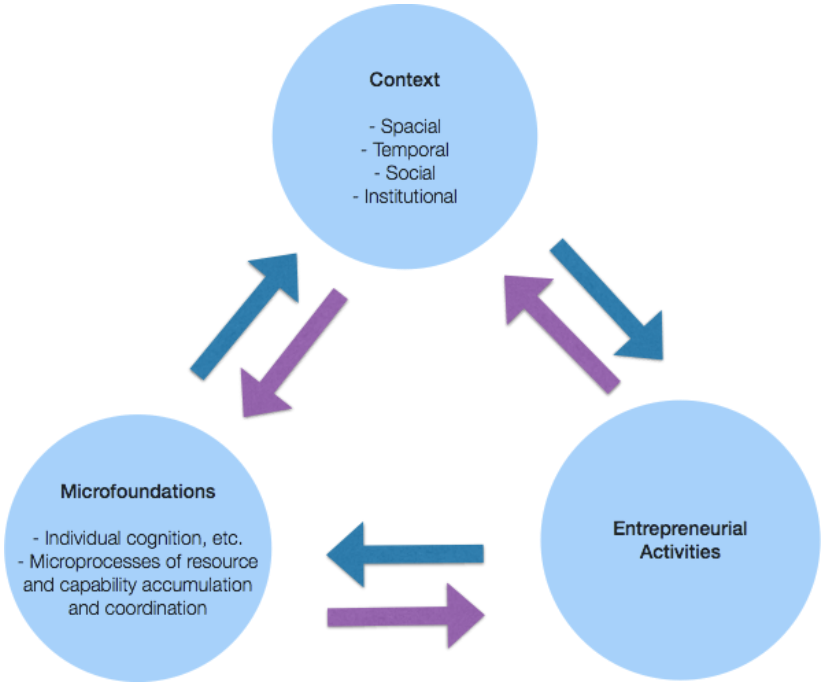
2.7 Research Framework

This research will explore how the contextual and dispositional factors discussed in the preceding literature review interacted to influence the collective process of entrepreneurial activity in the case of the AIYP project. To do so, the following multilevel research framework will be used which *contextualises* entrepreneurial activities and delineates the individual motivations whilst considering these interactively within their contexts (Fig 2.1). This research framework is based on one put forward by Zahra & Wright (2011). It has been adapted to take into consideration the interactivity between context and dispositional motivations that will be the key area of investigation. This adaptation is illustrated by the addition of a second, reverse arrow (highlighted in purple). This addition of the second arrow, however, introduces a significant layer of conceptual

[12] This is in fact in-line with a more recent article on contextual influences on entrepreneurship by Zahra et al., (2014) in which they have shifted their consideration of the institutional aspects of context to overlay all of the other dimensions.

and theoretical complexity which centres on the assumptions made by this framework as to the nature of entrepreneurial opportunity.

Fig 2.1 Multilevel Research Framework to explore dynamic interaction between context, microfoundations & entrepreneurial activities (adapted from Zahra & Wright, 2011).



To understand this complexity, it is necessary to reiterate the focus of this particular case study research. The AIYP project came about because a highly generic call for proposals from Innovate UK became - through *a process of entrepreneurial activity* (the focus of this research) - a multi-party collaboration which delivered an Audio-visual Wildlife Experience for visitors to Bristol Zoo. 'Entrepreneurial activity' is defined by Shane & Venkataraman (2000) as the process by which 'opportunities to create future

goods and services are *discovered*, evaluated and exploited'[13]. Therefore, by this definition, entrepreneurial opportunities exist exogenously to be discovered by the entrepreneur (Shane, 2003; 2011). The complexity is introduced because, in fact, there are other scholars who argue that opportunities are in fact *created* by the endogenous actions of the entrepreneur (Gartner, 1985; Sarasvathy, 2001). This is a long-standing debate in entrepreneurship research.

Whilst it is beyond the scope of this study to review the arguments in detail, the debate must be acknowledged because this research framework (Fig 2.1) makes the assumption that the outcome of the influence of the factors investigated could be either, or both, that the opportunity was exogenous and discovered, and/or that the actors involved in the project endogenously created the opportunity. This case study could therefore be criticised for displaying 'unresolved tensions without attempting synthesis' (Alvesson & Deetz, 1996: 212) but by examining the case through both - contradictory - lenses, this research could arguably also 'generate insights not possible in a world with only a single integrated perspective' (Barney & Alvarez, 2010). The philosophical implications of the debate for this research framework will be discussed in the methodology which follows.

3. Methodology

This methodology first presents the philosophical underpinnings of the opportunity 'discovery versus creation' debate, before discussing the philosophical implications for this particular research based on the framework presented in Fig 2.1. The following section identifies the 'nuts and bolts' of the methodology: the research method, the case, unit of analysis and data collection methods.

[13] In an article contemplating his 2010 Academy of Management Review decade award, Shane reflects that subsequent study of entrepreneurship has converged around this notion of opportunity discovery (Shane, 2013).

3.1 Philosophical Considerations

The two sides to the 'discovered vs created' debate are as follows: that there may be only one type of opportunity which is that objectively real exogenous opportunities exist to be discovered by the entrepreneur (Shane, 2003; 2011); that opportunities do not exist objectively but emerge, created by the entrepreneur (Gartner, 1985; Sarasvathy, 2001). This debate is further complicated by the 'philosophical impasse between entrepreneurship theorists employing different ontological assumptions regarding opportunity' (McMullen & Shepherd, 2006). The philosophical intractability is as a result of the fact that the opportunity discovery perspective draws on critical realist epistemology (Alvarez & Barney, 2010) where opportunity creation has been associated with social constructionism (Berger & Luckmann, 1967).

Contemporary critical realism is commonly associated with the British philosopher, Roy Bhaskar (1975) and emphasizes that reality exists distinct from conceptions of it (Alvesson & Sköldberg, 2000: 41): 'the world should not be conflated with our experience of it' (Sayer, 2000: 11). By contrast, for social constructivists, the (objective) reality in realist and critical realist perspectives is constructed through the interactions and perceptions of people (Berger & Luckmann, 1967). Social constructivism has been labelled a 'hotbed of irrationalism' (Godfrey & Hill, 1995) by its critical realist critics, but there has been a renewed impetus for constructivist ontology and epistemology amongst entrepreneurship scholars as it is suggested that it 'may shed new light on parts of the opportunity phenomenon that the discovery perspective is unable to illuminate' (Wood & McKinley, 2010).

This research attempts to consider both sides of the discovery-creation debate and in order to do so is underpinned by an evolutionary realist perspective, which developed (as a 'middle ground') out of the debate between critical realism and social constructionism (Campbell, 1974). As with social constructionism, this perspective still considers that individuals create the social constructs within which they operate. However, these social constructs may come into conflict with other phenomena and, in the case of evolutionary

realism, these other phenomena can be either dominant social constructions created by other individuals, or phenomena which are objective and defined as such by the critical realist perspective (Alvarez & Barney, 2010). What evolutionary realism offers in the context of this research is that it allows for environments that have both objective and subjective properties within which opportunities can be enacted (Alvarez & Barney, 2010). The assimilation by evolutionary realism of objectively real phenomena and socially constructed bearings of reality makes it possible to reduce the impact of any conflicting epistemological viewpoints that might prejudice this exploratory research.

3.2 Research Methods

Entrepreneurship research has a 'tendency to be dominated by positivism' (Xheneti & Blackburn, 2011: 386) and quantitative research methods. Hjorth et al. (2008) criticise such research, which they argue is deliberately 'decontextualised' in the search for context-transcendent 'general laws' of entrepreneurship. As a result, there has been a 'neglect of (more) qualitative or combined methods' (Welter, 2011) which allow the capturing of the richness and diversity of the contexts of entrepreneurial behaviour. As an exploratory case study, this research will be a rare example of contextualised qualitative research in this field. Yin (2003) defined 'case study' as an 'empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (Yin, 2003: 13). As the purpose of the research is to investigate the interactive contextual and dispositional influences on entrepreneurial behaviour, an exploratory case study is, in fact, the most appropriate approach to the research.[14] The research purpose and methodology go hand in hand; phenomena and explanations are situated in their context.

3.2.1 Case Selection

[14] It is assumed that no generalisations can be derived from a solitary case study about such a novel project. However, this is not to say that it is wholly without validity for the development of research into entrepreneurial behaviour. (See section 6. Future Research Avenues' for possible further studies which have emerged in light of the research into this particular case.)

Rather than entrepreneurship in the more traditional sense of firm-founding by individuals, the aim of this research is to explore entrepreneurial behaviour and activity as a collective process. As a part-funder of (often collaborative) innovation projects, a logical step was to search successfully completed Innovate UK backed projects. Furthermore, because these projects are only *part*-funded by Innovate UK, it promises that enterprising ways of behaviour would be required of the consortium partners to deliver the desired creative outcome. Of particular interest was Innovate UK's 2011 Collaboration Across Digital Industries (CADI) initiative, which was a £7 million investment by Innovate UK into improving co-operation between infrastructure providers, content producers, users and software developers. This initiative was interesting partly because of its focus on inter-industry collaboration and partly because, given the timing of the research, all of the projects funded by this initiative had been recently completed. Several different project groups from this initiative were contacted but access proved difficult, particularly as some projects included defence industry partners. Serendipitously, however, one of these projects was the Bristol-based AIYP project and, having previously worked at the BBC in Bristol, it was possible to gain access to this case through a contact there.

3.2.2 Case Description

The AIYP project won £680k of the £7 million available funding from the Innovate UK 'CADI' initiative to deliver an Audio-visual Wildlife Experience which was trialed at Bristol Zoo and Slimbridge Wetland Centre in October 2014. The project took place in Bristol from May 2011 - October 2014 and the total project budget was ~£1.4 million. The delivery of the project required an interdisciplinary team of specialists from a range of organisations which are presented visually in Fig 3.1. From each organisation there was one primary representative who was interviewed in the research. The list of interviewees can be found in Table 3.1.

Fig 3.1 AIYP Project Partners (AIYP website, 2015)

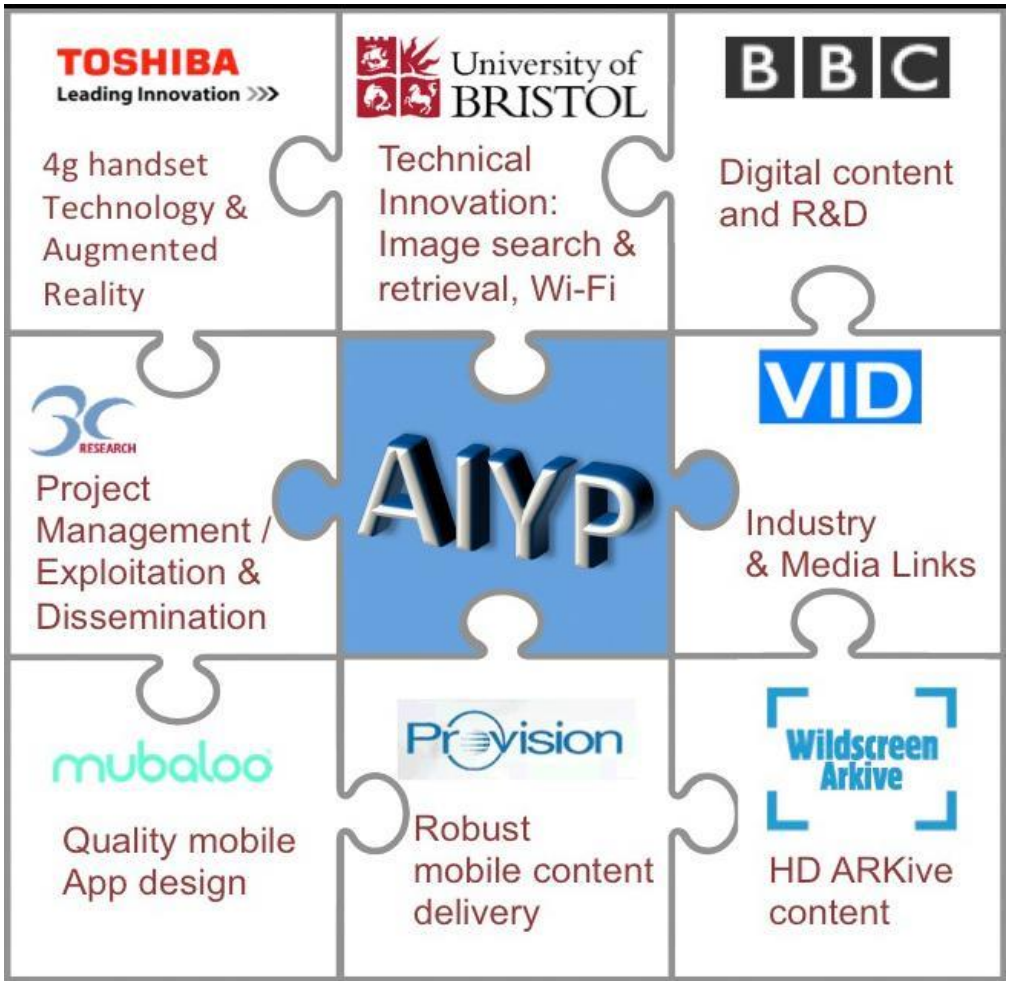


Table 3.1 Case Study Interviewees[15]

Company / Institution	Company Description	Role in AIYP Project	Interviewee	Position
mubaloo	Global digital agency developing apps and websites, founded in Bristol.	App Developer	Jason	Head of Operations
BBC	The R&D arm of the BBC specialising in creative technology. Based in Manchester.	UI expertise	Mary	Lead Research Scientist
VID	Independent media consultancy founded by Peter.	Independent media consultant	Peter	Owner, MD
3C RESEARCH	Technology Transfer office of the Engineering Faculty of Bristol University	Project Manager, Innovate UK liaison	George & Victoria	Project Lead & Project Manager
University of BRISTOL	Bristol University's Engineering Faculty, researchers in digital media and communications.	WIFI delivery design	Amy	Researcher working with professors Daniel & Aaron
TOSHIBA Leading Innovation	Telecommunications Lab of Toshiba Research Europe Ltd.	WIFI delivery implementation	Tom	Chief Research Fellow
Innovate UK Technology Strategy Board	Executive non-departmental public body, sponsored by the Department for Business, Innovation & Skills.	Independent monitoring offer on behalf of Innovate UK	Darren	Independent Monitoring Officer
AIYP Project Participants who could not be interviewed				
Provision	A Bristol University spin-off specialising in digital wireless video transmission.	WIFI delivery implementation and hardware suppliers	Daniel & Aaron	Co-founders
Wildscreen Arkive	Educational charity promoting nature conservation through wildlife film and imagery.	Wildlife video content supplier	Antony	Head of Technology

The project-specific social network structure of the relationships between each individual will be presented in Fig 4.1, ahead of the analysis of the findings proper.

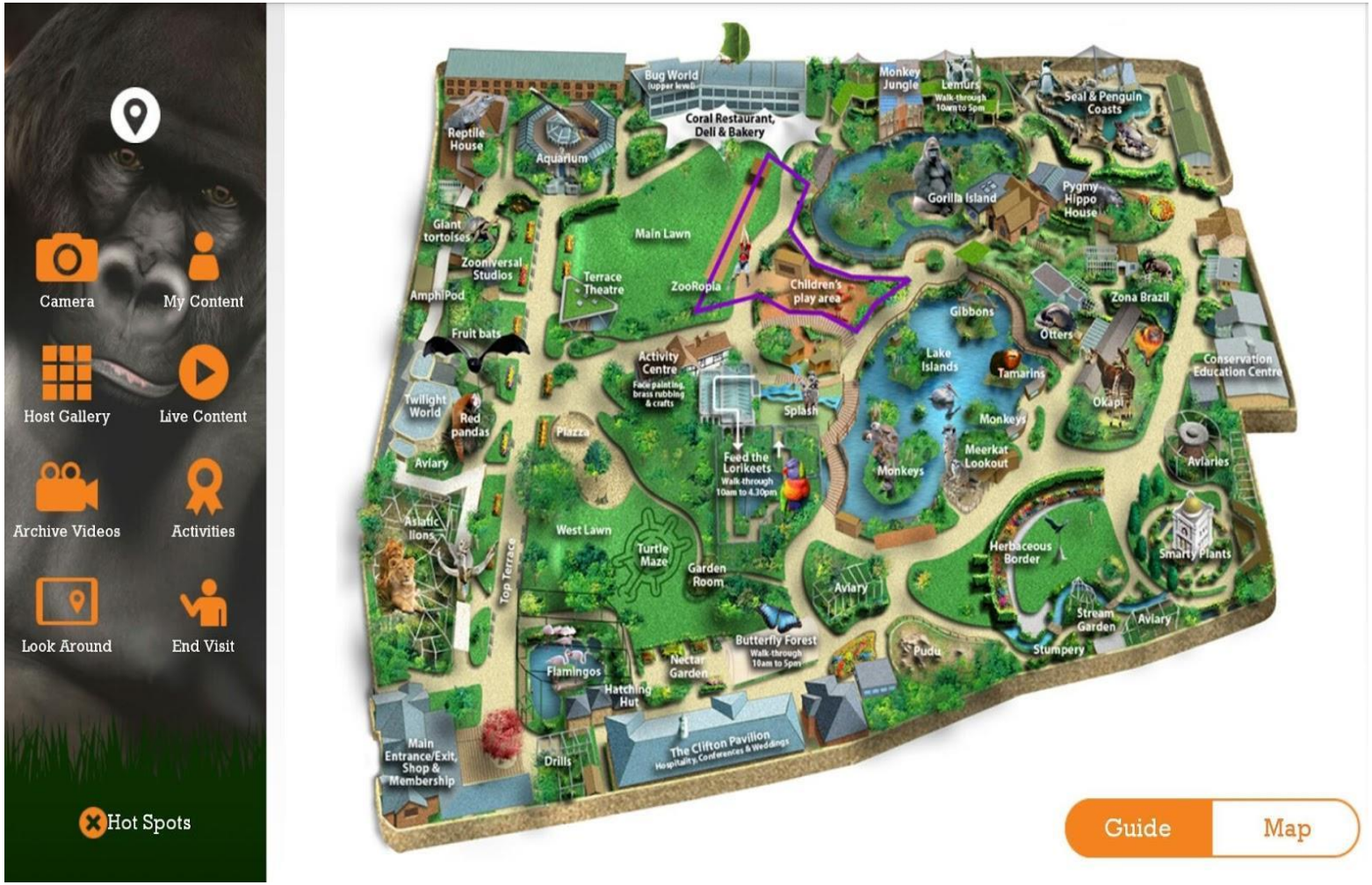
The AIYP Audiovisual Wildlife Experience

The Audiovisual Wildlife Experience developed by the AIYP project was a mobile application called Wild:i, created by app developers, Mubaloo. The app's aim was to provide visitors with an enhanced experience that combined the physical encounter with the exhibited animals and a virtual experience that provided a background on the animals' life in the wild. Video and stills (provided 'Arkive', the wildlife archive video footage division of the

[15] Names of individuals presented throughout are pseudonyms.

Wildscreen charity), were delivered over a bespoke WiFi network that was researched, developed and implemented by Toshiba Labs, UoB and ProVision. The project was managed by VID Communications and 3CR. All of the partners involved were Bristol-based with the exception of BBC R&D who provided support in the development of the user interface. The project was overseen by an independent monitoring officer for Innovate UK.

Fig 3.2 Wild:i App Interface



3.2.3 Unit of Analysis

There remains a question mark over the unit of analysis that adequately represents contextualized entrepreneurship (Welter, 2011). Whilst the AIYP project could well have been considered the principal unit of analysis with each individual representative from each organisation an 'embedded' (Yin, 2003) subunit, Yin (2003) makes the observation that when novice researchers conduct analyses at the subunit level, they often fail to return to the global level principal unit of analysis. Heeding Yin's caution, a holistic multiple-case study design (Yin, 2003) was adopted. Following Small (2009), each individual representative from each organisation was treated as their own case as, in certain circumstances, in-depth interview-based studies can 'be conceived as not small-*sample* studies but multiple-*case* studies' (Small, 2009 - emphasis in original).

3.2.4 Data Collection and Analysis

Treating each individual representative from each organisation as their own case, face-to-face, semi-structured interviews were conducted (see Table 3.1). Although not part of the core team, the Innovate UK monitoring officer was also interviewed (over Skype) to get a clearer picture of Innovate UK's role and motivations. Interviews allow the researcher to 'see the research topic from the perspective of the interviewee and to understand how and why they come to have this particular perspective' (King, 2004: 11). To reinforce the advantage of this data collection method, after some initial questions, the participants were left to guide the direction of the interviews and ad hoc questions were asked; these are legitimate in exploratory case study research (Eisenhardt, 1989: 539)[16].

With the permission of the interviewees, all interviews were recorded, then transcribed, examined, categorised and tabulated (Yin, 2003). The key quotes were tabulated based on Zahra & Wright's (2011) pre-determined dimensions of context and any quotes referring to personal motivation were placed under a further category. The process

[16] This level of flexibility was particularly important in this case; the rationale for the research being to expose context-specific interactions and individual motivations than to find any replicable, generalisable patterns.

of tabulation was particularly challenging due to the fluidity of the data, which in most cases could not be neatly compartmentalised under a single category. Of course, clean-cut categorisation is not the aim of the research, rather it is to convey the intricacy and interrelatedness of the contextual influences as well as its interactivity with individual motivations in a way that 'approaches the complexities and contradictions of real life' (Flyvbjerg, 2006: 237). However, to convey the findings in a coherent way, the data analysis is structured around each dimension of context, but this should not be seen as a rigid framework.

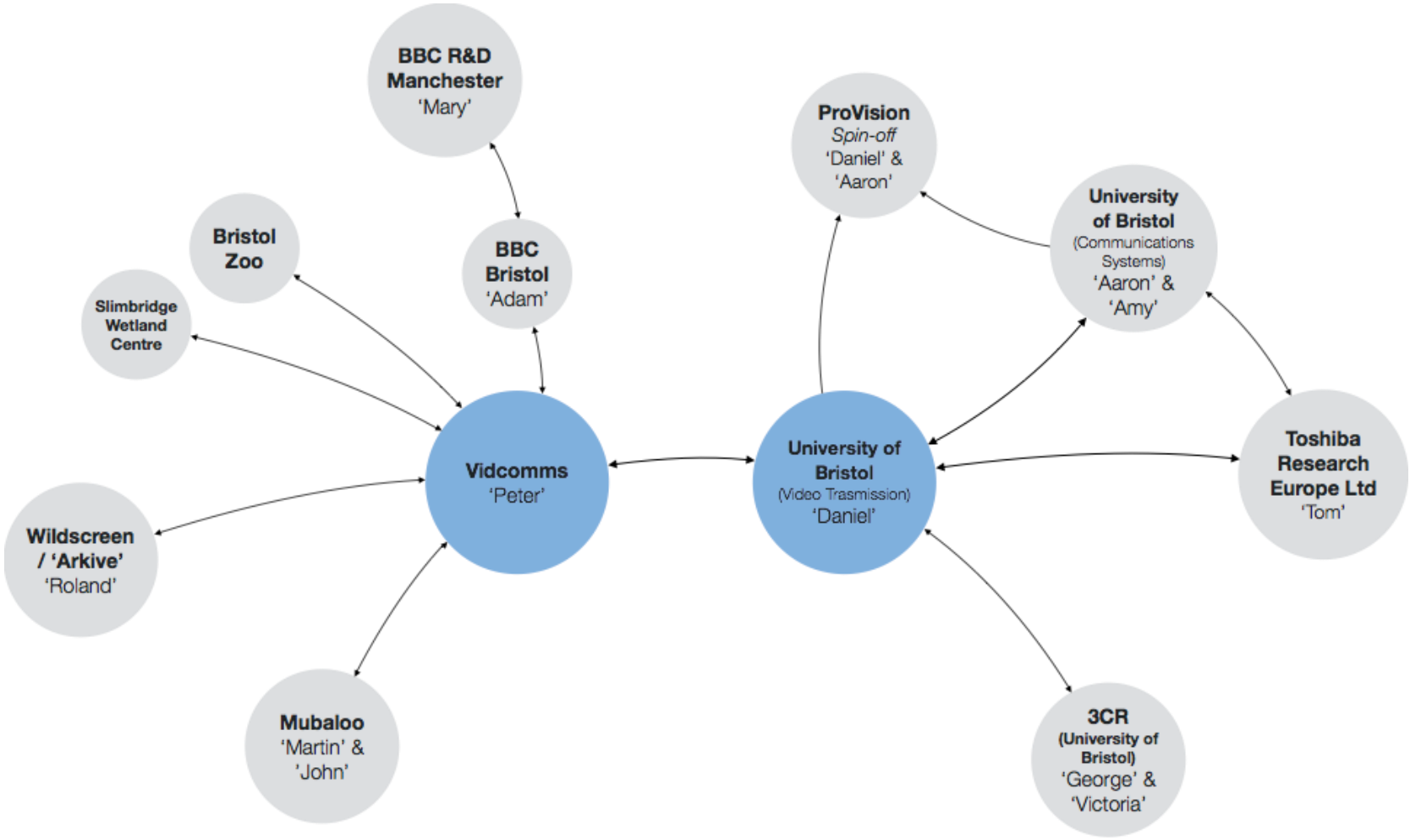
4. Findings

This section is structured as follows. First, before the analysis begins, a visual representation of the project-specific social network is presented in Fig. 4.1 to illustrate the links between the interviewees listed in Table 3.1. The analysis itself begins from 4.1. The qualitative data is presented concurrently with the analysis. Echoing the participants, the use of first names is adopted throughout. Combining first names and quotes within the analysis means that the style leans towards informality, but this in itself helps to communicate the atmosphere and dynamics of the group, as well as their interactions, in a way that is lost in quantitative research; this data analysis is intended to be read as a narrative. This section concludes with a discussion in which the findings are summarised.

4.0 Social Network Structure

Fig 4.1 is a visual representation of the project-specific network. The AIYP project consortium brought together two sets of social groups through Daniel and Peter's respective networks. Daniel, a professor from the UoB, provided links to technical expertise in video transmission and communications from the UoB, Toshiba and his own UoB spin-off, ProVision. Peter spent 30 years working at the BBC in Bristol as a wildlife TV producer. His links are to the creative and digital industries as well as to local environmental and wildlife organisations, including Bristol Zoo and Slimbridge Wetland Centre which became locations for the AIYP trials.

Fig 4.1 Project-specific Network Structure



4.1 Social Context

The AIYP project consortium brought together two sets of social groups through Peter and Daniel's respective networks. Peter and Daniel's relationship represents a 'structural hole' (Burt, 1992) which is apparent from the visualisation of the project-specific network presented in Fig. 4.1.[17] All of the relationships presented in Fig. 4.1 originated either from formal professional interactions taking place in an organisational context or from meetings at Bristol-based events organised by local institutions, but many have evolved to have social and informal aspects. Peter and Daniel's relationship is an example of this. They met through a local event and theirs has become a very social relationship:

"*Always delighted to see each other, quite a lot of that involves having a pint.*"

The organisational relationship between Toshiba and the UofB is a formal R&D alliance (Hagedoorn et al., 2000). Part of that alliance means that "*7 or 8 PhD students*" work on Toshiba-backed research at any one time. The movement of the students between the two has created informal and formal social links (Perkmann & Walsh, 2007).

"We [Toshiba] knew a couple of the University participants quite well from the past. The person doing most of the research aspect, his PhD student was also working on the project so they were quite familiar."

The Wildscreen charity also has a formal relationship with the BBC's NHU; the NHU donates hours of wildlife archive video footage to the charity's video division, 'Arkive'. Having worked together through the BBC's NHU, Peter's relationship with the Wildscreen CEO is both long-standing and personal.

[17] Through the interviews it became clear that the extended project network (around the core network presented in Fig 4.1) was a highly interconnected one (Ulhøi, 2005). See Appendix (Fig. A) for a visualisation of this.

"I'd known [the CEO of Wildscreen] forever, so a lot of it came from a sense of, "I'd love to work together."

This snapshot of relationships reveals that many seem to be facilitated by being spatially bounded in the city of Bristol, conflating the social and spatial contextual dimensions. Furthermore, it is apparent that the ties between the individuals are both business and personal. This supports the notion that individuals' business and personals networks need to be taken into account when coming to grips with the entrepreneurship phenomenon (Ulhøi, 2005).

A few years prior to the AIYP project, the UoB and Toshiba had collaborated on a different – but related - Innovate UK funded project called 'Visualise'. It provided content to spectators at the World Rally Championships using *"similar-ish technology, not as advanced"*. When the AIYP project came about, George from 3CR explains that Toshiba were therefore "*the obvious partner to look to try to be involved"*. Bringing forward both their relationship and experiences from 'Visualise' into the AIYP project suggests that the notion of past experience and shared previous knowledge formed a backdrop for present actions (Bird & West, 1997), and was an important consideration for these partners. Perhaps too existing trust (Greve and Salaff, 2003) and even convenience (Forbes et al, 2006) also contributed to Toshiba being the "*obvious"* partner.

While the UoB and Toshiba were developing 'Visualise', Peter was separately involved in his own Innovate UK funded project with Wildscreen. This was a 'Feasibility Study'[18] which was a basic prototype of the AIYP project. Sometime after both projects were completed, Peter attended a local event where Daniel was presenting the 'Visualise' project. This was the occasion when Peter and Daniel met for the first time. When the AIYP project call came out, Peter began to link his past experiences with his social ties as a means to access sources of knowledge (Leyden, Link & Seigel, 2014).

[18] An Innovate UK 'Feasibility Study' is a smaller, proof-of-concept project produced with around £50,000 of funding.

"So when this [Innovate UK] call came out, again having done the Feasibility Study, I thought there is a thing to move forward on here - which is the mobile bit - and I thought, "Well I know Martin at Mubaloo and I know Daniel at the UoB", so there was enough connection there to think, there is something here…"

Arguably, the reason that Peter was able to recognise the value of the information about the 'Visualise' project to then leverage his social network was because of his own prior experience (Shane, 1999) with the Feasibility Study.

The related notion that people notice information that is similar to information they already know (von Hippel, 1994) is apparent in the reason Peter gives for being alert to the work done by Mary's team at BBC R&D who were creating two content-based mobile experiences called 'Participate' at London Zoo, and 'Stores at Kew' at Kew Gardens. As part of his work as a wildlife TV producer at the BBC in Bristol, Peter was also involved in producing multi-platform content[19]. Peter explains:

"*Because I was doing multi-platform stuff inside the BBC, I'd got to know about ['Participate' and 'Stories at Kew'] and I just took an interest in them.*"

From Peter's comments it is difficult to suggest with certainty that his alertness to BBC R&D's work may have increased as a result of a convergence of his professional (Domain 2) knowledge with that of any (Domain 1) knowledge gained from a personal interest in an area (Sigrist, 1999). In Mary's case, however, this is unambiguous. Prior to her involvement on the AIYP project, Mary had in fact already actively requested to work with the BBC NHU in Bristol on future research projects. The reason she gives for this is a personal one: Mary was *"doing another degree at that point, on Environmental Science*". When the AIYP project subsequently came up, Mary *"sold the project internally"* as a way to expand and enhance organisational (Domain 2) knowledge, but she was also motivated by her own (Domain 1) interest.*"Besides"*, she adds *"I love the* [wildlife] *content, which is*

[19] 'Multi-platform' is a term used in the television industry to describe video content which is made available across online, tablet and mobile – as well as through traditional broadcasting.

my own personal thing". This personal interest will be addressed again under the Entrepreneurial Motivation section in 4.5.

4.2 Spatial Context

What has already been established is that the geography of entrepreneurial activity has a significant implication for the influence of social network structure on opportunity identification and resource mobilization (Stuart & Sorenson, 2005). The conflation of the spatial context with the social will therefore not be addressed in detail again here. Instead, the section will analyse spatial context in terms of regional institutions. The spatial institutional context has, in fact, overlaid many of the social ties that have already been discussed; interviewees have met at events organised by local and regional public institutions in Bristol. These institutions include Bristol Media CIC and the West of England Local Enterprise Partnership, which facilitate interactions and knowledge sharing among different regional sectors (Marquis & Battilan, 2009).

Tom from Toshiba observes that whilst Toshiba are not involved in a follow-on proposal from the AIYP project (because they are no longer focussing on digital media)

"…we do occasionally attend events related to that Local Regional Digital Media Industry Group, […] just to keep our hands in in terms of what's going on."

Many of these local events have been held at the Watershed, the publically funded digital media hub where the demonstration of the 'Visualise' project took place. For Peter, it is a key location:

"For years before I finally left [the BBC] I was connecting into things outside [of the BBC], [in] the city - predominantly through this place, through Watershed, so I was engaging with what was going on largely out of curiosity."

Peter's involvement with events at the Watershed also touches back on the social context: his frequent attendance of local events at the Watershed has contributed to his large network and high network centrality (Aldrich & Reese, 1993) apparent in Fig 4.1.

The key role that the UoB plays in shaping the local knowledge network and promoting local innovation (Amin & Thift, 1994) is made evident by the involvement of Toshiba, ProVision and 3CR in the AIYP project: "*Toshiba decided to base [its European Research Lab] in Bristol because of the connection with the UoB*"; ProVision is a UoB spin-off ; and 3CR is a UoB funded facilitator acting in a "*bridging role*" at the interface between academia and industry. A highly interactive innovation ecosystem clearly exists with the UoB at its core. These organisations all work with major partners at a national, European and global level, but the frequent local interactions between public and government agencies, universities, firms and industry organisations (Cooke et al., 1997; Braczyk et al., 1998) suggest a Regional System of Innovation at work.

4.3 Institutional Context

Innovate UK has played an important enabling role at many stages in the evolution of the AIYP project; without its funding neither Peter's Feasibility Study, the UoB-3CR-Toshiba 'Visualise' collaboration, nor the AIYP project itself would have taken place. Public funding is often provided with the purpose to maximise disclosure and spillovers (Miotti et al., 2003) and this was explicitly the aim of the funding call won by the AIYP consortium. Darren, the Innovate UK monitoring officer for the AIYP project recalls:

"The Innovate UK competition overall was called Collaboration Across Digital Industries so the idea of the whole competition was to mix up companies together and different types of companies. So that was the point of it: technology transfer or knowledge transfer."

For the UoB, Amy observed that as well as the funding, Innovate UK enabled,*"the organisation and all of the team. If you want to do trials of a system like that then you need*

a group of companies and a group of people working together, it's not easy as a university to do that."

The need for 'organisation' as well as academics to facilitate innovation is something that was observed in the literature by Nelson (2000).

While strength in 'high-tech' depends upon the availability of university trained people, industry more generally requires a supply of literate, numerically competent, people in a wide range of functions outside R&D. (Nelson, 2000: 19)

This can be found in the project management and "***bridging role***" which 3CR provided. George points to the need to have dedicated individuals working at the interface between academia and industry to bring a project together and take it forward. He states that whilst *"Daniel could do that. Peter could do that - it's not really what their focus is on*". These complex interactive relationships between different institutions, sectors and organisations advocated by the NSI approach are integral for innovation, but a high level of organisation is integral to maximise the outcomes.

4.4 Temporal Context

Through tabulating the data, it became clear that the temporal context was an unexpectedly intriguing facet of the research. Although not explicitly discussed, this context - perhaps unsurprisingly - pervaded many of the responses by the interviewees. In the responses from the participants whose prior experience on projects fed into the AIYP project, there was a recognition of the value of past experiences, and how that had been distilled into new insights (Zahra et al, 2000) and then exploited on the AIYP project. Mary explains:

"So what has been really good is that all this technology which, when we were doing Stories at Kew, we knew was on the horizon, and we used smoke and mirrors to mock it up but actually in AIYP it was a real live running framework […] and for the first time we could trial it."

The notion of building on prior knowledge and past experiences from the perspective of venture life cycle and entrepreneurial processes (Carter et al, 1996; Gartner, 1985) is a pleasing narrative for Innovate UK.

"Innovate UK do like projects to go up their funding path so you can get smaller grants for 'Feasibility Studies' - so that's in the £50k mark and then you can work your way up through proof-of-concept, small project, large projects."

The entrepreneurial life cycle is a temporal phenomenon. As well as linking the temporal context to the evolution of knowledge and technology, another major theme which emerged from the analysis was a sense that the project occurred at the 'right time'. Timeliness seemed to be a striking motivating factor either from the perspective of the participants' organisations or because it coincided with a personal interest. From an organisational perspective, Toshiba were keen to be involved "*because at that time we were in liaison with the [BBC's] Professional Broadcast division"*. For Mubaloo, the convenience of the timing coincided with an existing desire to give something back to the local community.

"…at the time we were relatively quiet and hadn't really done any apps to help the local environment or anything to give back to the environment around here. So at that point in time it just seemed like the perfect opportunity for us to get involved."

From a personal perspective, the Environmental Science degree which Mary was undertaking alongside her work *"at that point*" was a driving factor for her involvement on a wildlife project utilising BBC NHU content. For his part, Peter had just left the BBC to set up a company which was "*only me"* with a *"one page website*" and wished to be seen to be working with established partners for the benefit of his newly founded business[20]. Peter recalls:

[20] The reason Peter wished to be seen working with established partners was for the *"reputational value"*(P.19) to his newly founded company. This behaviour has been observed in the literature:

"What I wanted to have is a list of people [...] on that website. Of course as soon I engaged with the project I could say that I'm working with these people. It meant that for 3 and a half years I could say I was working with the UoB."

Evidently for both Peter and Mary, the timeliness of the project was tied to personal motivations. This points to an idea that will be investigated further in the analysis of the influence of dispositional factors which is this: active entrepreneurial exploitation of an opportunity is strongly motivated by a personal interest that itself coincides with the time at which the opportunity presents itself.

4.5 Dispositional Influences on Entrepreneurial Behaviour

Throughout the above analysis, most notably in relation to the temporal context, there have been hints of the personal reasons stipulated by certain participants as a driving factor for their involvement in the AIYP project. The following section will now present and analyse the entrepreneurial motivations that emerged as themes from the data. One motivation that was included in the literature review but notably did not emerge as a theme was 'risk-taking. Perhaps because the project was part-funded by Innovate UK, risk-taking does not seem to be a driving element in this story and will therefore not be discussed in this section.

When the AIYP project was in its early stages, George at 3CR described how he was *"personally looking for an interesting project that could then be funded to lead and to manage"* because "*as a non-academic in the University, you don't actually get a lot of*

---

entrepreneurs seek legitimacy by associating with well-regarded individuals (Hoang et al., 2003). Peter's assessment of value of these relationships - of being able to say *"I work with BBC Bristol partnership, I work with Toshiba, I work with University of Bristol, I work with Watershed, I work with BBC R&D"*(P.19) - is in fact supported by empirical research; positive perceptions based on a firm's network linkages have been shown to lead to subsequent beneficial resource exchanges (Stuart et al, 1999).

chances to actually lead a project"[21]. This active search for his own project to lead points to one of the key entrepreneurial motivators presented by Shane et al. (2003): a desire for independence (Hornaday & Aboud, 1973). This trait is also evident in Mary's efforts to push forward on a project which was "*considered to be a 'secondary project', and not part of [BBC R&D]'s core work plan"*[22].

Both George and Mary display a strong sense that working as largely autonomous representatives of their organisations on collaborative projects requires a high level of independent motivation in order to find a project, sell the project internally and then actually deliver the project. George hints at the extent to which a sense of independence is required for such a project:

"It's the people who are enthusiastic and want to be involved in collaborative projects, not necessarily - you don't necessarily have full buy-in from senior management."

Peter is more explicit in his own desire for independence, something also apparent in the founding his own company, Vidcomms, a key participant in the AIYP project. Of the AIYP project, he makes the observation that it would not have been something he could have been involved with as an employee of the BBC.

"[At the BBC] I wouldn't have got anywhere near this. Even with the autonomy I managed to squeeze into my role, there would have been a very clear, "Well you're not doing that because you've got to be doing this." […] You don't let a Series Producer who's just done

[21] Under the Institutional Context (4.3) it was established that multi-party collaborative R&D projects such as AIYP require a significant level of organisation and project management to be brought together, funded, administered and delivered. The AIYP project can therefore only have benefitted from George's enthusiasm for the project.

[22] In fact, for all partners interviewed, this was not their sole project – in many cases, as Mary puts it, the AIYP project was considered a *'secondary project'* (M.15) - and almost all interviewees discussed the challenges of juggling multiple projects alongside their commitment to AIYP.

something called Planet Earth suddenly unleash himself on transforming the experience of Bristol Zoo".

Of all of the participants, it was from the interviews conducted with George and Victoria (3CR), Mary (BBC R&D) and Peter (Vidcomms) that the theme of independence emerged most strongly.

Self-efficacy came across most strongly from Peter, manifest in his use of phrases such as *"no-brainer"* and "*blindingly obvious*". What is particularly interesting in Peter's case is how this self-efficacy is intrinsically tied to his social network. His first Feasibility Study was a "*good tip*" from a contact at Wildscreen and he explains that the reason that it was a "*no-brainer*" was because he'd *"known [Wildscreen] since they started*".

Peter's confidence in being able to achieve and successfully deliver the AIYP project may also have been increased by the co-location of all of the partners. Peter observes that whilst you could "*certainly work with this [project] across the world*", having a Bristol-based team was a notable "*passive reinforcer*"; the possibility of random face-to-face interactions added another layer of assurance that the participants would actually fulfil their respective obligations.

"The chances that you might brush across someone [in Bristol] keeps you in the "I'll do what I said I'd do". It's harder to turn down in a face-to-face environment than it is in a conference call once a quarter environment."

This suggests that Peter's self-efficacy is increased by the proximity of the individuals in the team to each other. This acts to reinforce the governance of the network (Pruitt, 1981).

This governance mechanism in action was evident in a telling response from Jason from Mubaloo. When asked whether he was still in touch with anyone from the AIYP project now that it has been completed, he responded that he wasn't, but that

"I bump into Peter now and again. I bumped into him at an Awards Ceremony. I bump into him walking the streets but we don't specifically get in contact".

What was revealing was that Jason then - unprompted - continued to say,

"I think near the end of the project as well, because internal Mubaloo work was getting more and more busy I was missing more and more meetings so I think there may well have been a perception at the end that we were either way, way too busy (which we were) or we kind of lost interest which wasn't true we just… I couldn't take… some meetings were taking 3 or 4 hours and I had client meetings and I couldn't be skipping that to go to these other meetings."

Jason's response suggests a sense of guilt that he might have been perceived to have shirked some of his responsibilities to the group and to the AIYP project. Even after the project conclusion, the face-to-face governance effect is clearly still having an effect on Jason, suggesting that Peter's self-efficacy in this respect is well-founded.

The sense of 'drive', an entrepreneurial motivator put forward by Shane et al. (2003) to encompass the attributes required for long-term persistence - ambition, energy and stamina - came across most strongly from 3CR's interview in three ways. First, the project hit a stumbling block in its early stages when a major partner at the time - Motorola - dropped out following its acquisition by Nokia Siemens. This meant that the project had to be downsized with major revisions made to all of the paperwork and budgets. George observed in light of such challenges *"you've got to collectively really want to do it*" and that *"I think if I hadn't been there to do that [the revisions to the budgets and paperwork], it's unlikely the project would've gone ahead"*.

Second, George and Victoria were the only interviewees who discussed the far-reaching future implications for the project. They viewed the AIYP project as less of a wildlife-specific experience and instead a more generic *"fantastic WiFi delivery system"* which they envision could come about *"10-15 years"* in the future. To get there, they believe the next

step - *"rather than waiting for another call"* - is to approach Innovate UK directly with a view to accessing a budget of a *"few million pounds, maybe 10 million pounds"*. This level of commitment to the future possibilities around the project certainly suggests something more than just being, as George puts it, *"interested in it"*[23]. This leads to the third point. Shane et al. (2003) observe that a key ingredient of 'drive' that provides such a sustained level of effort "is, strangely enough, love" (Shane et al., 2003). Victoria concludes:

"*because we're funded on our other projects at the moment, so taking [the AIYP project] forward, we're doing it out of love for the project really*".

4.6 Discussion

4.6.1 Contextual Dimensions

This analysis has shown that the conflation of social and spatial contexts overlaid by the institutional context as a facilitator - both at the national level through the Innovate UK funding and the regional level public institutions and events - were key to influencing the entrepreneurial behaviour that led to the AIYP project. The widespread recognition of the prior knowledge context from which the AIYP project emerged has shown that this could be considered to be an additional key factor.[24] Although Tom from Toshiba observed that the project was still at an early, *"pre-competitive"* stage, the extent of the prior knowledge points to the project being an incremental, rather than radical, innovation; Freel's study that showed that incremental product innovators appear to be more locally embedded therefore stands firm (Freel, 2003 pp. 767). It also, however, shows the benefit of having multiple knowledge sources in a region with universities, users and existing firms bringing together their respective insights (Agarwal & Shah, 2014).

Whilst this referred to in an RSI context as the 'local' university, the UoB's Engineering Faculty is in fact a world leader in communications technologies - as

[23] Particularly so in light of George's earlier comments about "*not necessarily having full buy-in from senior management"*.
[24] Peter observed that for all of the partners involved, the AIYP project was *"a good way amplifying what they'd done already so everybody brought particular skills"*.

evidenced by its attracting Toshiba to locate its European Research Lab in the city. The Engineering Faculty has *"professors with a vision to set up their own company"*[25] and a dedicated technology transfer team to facilitate the project, factors contributing to a highly interactive innovation ecosystem. Darren, the Innovate UK monitoring officer, observed.

"You can tell that there's a sort of hub of, a coming together of technology and content in Bristol [...] there's a nice, vibrant feel to what they were doing"

The 'coming together' was summed up by Jason from Mubaloo:

"I think [Mubaloo joined the project], literally from an off-the-cuff comment. So Peter had his involvement and he's friends with our CEO and I think they were just at a local event, and Peter mentioned. 'Oh we're doing this, we're looking for someone to develop the app'. And at the time we were relatively quiet [...] so it just seemed like the perfect opportunity for us to get involved."

However, what may - in a very literal sense - seem to be a serendipitous passing comment was actually the combined interaction of social and spatial context, facilitated by an effective local institutional context, all combined with the timeliness of the encounter.

4.6.2 Dispositional Influences

Whilst it is clear that the contextual factors played a part, the personal motivations of the individuals involved were integral to enabling the project. The project was only part-funded by Innovate UK and, interestingly, there appears to be a split in the entrepreneurial traits expressed by the individuals involved based on whether their respective organisations did or did not see a direct strategic benefit for their involvement in the project. When asked about the reasons for being part of the project, Toshiba, UoB and Mubaloo unhesitatingly presented strategic organisational reasons for their involvement. For Tom, Toshiba had a desire to work with the BBC to support another area of the business; for the UoB, it was a rare opportunity to conduct trial-based research. For Mubaloo, the key motivator for the

[25] Referred to in the literature as 'star scientists' (Zucker & Darby, 1996)

company was to "*do something for the local community*". The individuals from these organisations did not express strong entrepreneurial motivators in their interviews.

By contrast, the four individuals who did express key entrepreneurial motivational traits - George and Victoria from 3CR, Mary from BBC R&D and Peter from Vidcomms - were also those who did *not* describe a clear and direct organisation-led strategic reason for their respective involvement in the project[26]. Indeed, in Mary, George and Victoria's cases, there was a sense of the strong need for personal interest and persistence to pursue a project which was not directly linked to a "*core work plan".* These individuals were also those who expressed a strong personal interest in the project (which in some instances was also related to the time at which is occurred): George to enhance his professional life; Mary to support her passion for environmental science; Peter to benefit his fledgling business. These findings suggest that the project offered a direct *personal* value to these individuals, manifest in the key entrepreneurial motivations of independence, self-efficacy and drive. This suggests that alongside highly favourable and interactive contexts, individual motivations do play a significant role in enabling entrepreneurial behaviour and activity.

5. Conclusion

This paper set out to understand how key contextual and dispositional factors interact to influence a collective process of entrepreneurial activity. This was an unusual approach in a field where research into entrepreneurial behaviour has tended to focus either on contextual or dispositional factors but rarely links the two (Thornton, 1999; Sørenson, 2007). What the case study has shown is that favourable contexts – which are often interrelated - are crucial enablers of collective entrepreneurial activity. In the case of the AIYP project, the findings suggest that that the overall contextual environment was conducive to entrepreneurial activity. In some instances, however, dispositional factors were also shown to play a critical role in influencing entrepreneurial behaviour. Dispositional factors were most apparent in instances where the contextual environment

[26] As Peter's company is his own, it is assumed that his personal and organisational motivations are aligned.

was not as advantageous. In this case, the less advantageous context in question was the day-to-day organisational context from which these representative individuals operated as members of the wider consortium. It is, of course, impossible to generalise from a single case, but this does suggest new and worthwhile research possibilities, some of which are highlighted below in section.

Based on this research, and in order to explore further the largely neglected area of mutually constituted explanations of contextual and dispositional influences on entrepreneurial behaviour, a case could be made for adapting Zahra & Wright's (2011) research framework to that which was presented in Fig 2.1. This proposed framework for future research may also help to shed light on other ongoing debates in entrepreneurship research more broadly. Whilst it is beyond the scope of this research to make an argument for either side of the debate as to whether opportunities are exogenously discovered or endogenously created (Alvarez & Barney, 2013), Zahra et al. (2014) have observed that a reason for this ongoing discussion is because the lack of contextualisation means that 'the different effects of individual, situation, and serendipity are unclear' (Zahra et al., 2014). Further research that considers contexts and motivations, as well as their interactions should therefore surely help to clarify some of these arguments.

It has previously been argued that there is a need to empirically integrate the process and context of entrepreneurial activity (Aldrich & Martinez, 2001) because linking observations, questions, and methods to context is crucial to theory building (Whetten, 1989) and, moreover, policy action seeks to influence entrepreneurial activity by manipulating the contexts in which individuals operate (Audretsch et al., 2007). However, this study suggests that a focus on contexts alone is not sufficient; even considering contexts interactively still chimes very closely with the existing Systems of Innovation approach which, as its key proponents also recognise, 'brings with it a structuralist mode of explanation that neglects the critical role of agency' (Lundvall, 2007). The proposed framework (Fig 2.1) with its inclusion of individual motivations is therefore an opportunity to address this recognised shortfall.

This is not in any way a criticism of policy that has emerged from the NSI approach. Indeed there is strong evidence that Innovate UK played a crucial enabling role in this case. There is a clear positive implication for its funding that the consortium partners saw as an opportunity. But what this research reveals is that individuals who are 'alert' to opportunities to create future value (Shane, 1999), might, in fact, perceive that value to be *immediate personal value* - to pursue their personal interests or careers, or grow their professional networks - as much as it is long-term 'economic' value, which these policies are designed to create. Considerable further academic research into the interactivity of contextual and dispositional influences on entrepreneurial behaviour is required for theory building. However, if this research yields robust theoretical outcomes, innovation policies could be developed to leverage *perceived personal value* alongside potential economic value, which would surely be a powerful driver for future national economic growth.

6. Future Research Avenues

The case has been made for further academic research into the interactivity of contextual and dispositional influences on entrepreneurial behaviour. A particular area of investigation might be whether, in successful collaborations, individual entrepreneurial motivations might emerge most strongly as a response to an unfavourable environmental context which may need to be overcome.[27] However, consideration of these factors interactively may well be some way off as there are still significant gaps in the literature in relation to some of the contextual dimensions (as well as the recognised underdeveloped literature on dispositional approaches). Entrepreneurship scholars are yet to develop a coherent and theoretically grounded framework to study time and its consequences (Welter, 2011), but this study has found that timeliness was a striking driving factor influencing entrepreneurial motivation and behaviour, and would appear well worth further investigation. Furthermore, research which links the spatial and relational aspects of regional environments to the microprocesses of entrepreneurship is also relatively

[27] The co-location of partners on the AIYP project was discussed in positive terms by almost all interviewees. It is conceivable, therefore, that on a collaborative innovation project where the partners are more disparate in location, the spatial (and consequently, social) contexts may become those which require greater entrepreneurial motivation in order to be overcome.

underdeveloped (Thornton & Flynn, 2003). Therefore, although Shane et al., (2003) have been criticised for considering motivational variables independently from their environment, their argument in doing so is that it is 'important for researchers to understand the main effects of these variables before they explore more complex, interactive effects'. This point is likely to be valid for further research into the contextual dimensions, a few of which were highlighted above; future research should therefore focus on developing these areas independently, whilst also considering these in tandem with theories of interactivity.

7. References

Abell P, Felin T, Foss N. 2008. Building micro-foundations for the routines, capabilities and performance links. *Managerial & Decision Economics* 29, 6, pp. 489-502.

Ackroyd S, Fleetwood S. 2000. Realism in contemporary organisation and management studies. In *Realist Perspectives on management and organisations*, Ackroyd S, Fleetwood S. (eds.). Routledge: London; pp. 3-25.

Àcs ZJ, Autio E, Szerb L. 2014. National Systems of Entrepreneurship: Measurement issues and policy implications. *Research Policy* 43, pp. 476-494.

Agarwal R, Shah SK. 2014. Knowledge sources of entrepreneurship: Firm formation by academic, user and employee innovators. Research Policy 43, pp. 1109-1133.

Aldrich HE. 1999. *Organizations Evolving*. Sage: Newbury Park, CA

Aldrich HE, Martinez MA. 2001. Many are called, but few are chosen: An evolutionary perspective for the study of entrepreneurship. *Entrepreneurship Theory and Practice* 25, 4, pp.41-56.

Aldrich HE, Reese PR. 1993. Does networking pay off? A panel study of entrepreneurs in the research triangle. In *Frontiers of Entrepreneurship Research*, Churchill NS et al. (eds.). pp. 325-339.

Aldrich HE, Zimmer C. 1986. Entrepreneurship through social networks. In *The Art and Science of Entrepreneurship,* Sexton D, Smilor, R (eds.). Virginia: Ballinger Publishing Company

Alvarez SA, Barney JB. 2007. Discovery and creation: Alternative theories of entrepreneurial action. *Strategic Entrepreneurship Journal* 1, 1, pp.11–26.

Alvarez SA, Barney JB. 2010. Entrepreneurship and epistemology: The philosophical underpinnings of the study of entrepreneurial opportunities. *The Academy of Management Annals* 4, 1, pp.557–583.

Alvarez SA, Barney JB. 2013. Dialogue: Epistemology, Opportunities, and Entrepreneurship: Comments on Venkataraman et. al (2012) and Shane (2012). *Academy of Management Review* 38, 1, pp.154-157.

Alvesson M, Deetz S. (eds.). 1996. *Critical theory and postmodernism approaches to organizational studies*. Sage: Thousand Oaks, CA.

Alvesson M, Deetz S. 2000. *Doing Critical Management Research*. Sage: London.

Alvesson M. Sköldberg K. 2000. *Reflexive Methodology: New Vistas for Qualitative Research*. Sage: London.

Amin A, Thrift N. 1992. Neo-Marshallian nodes in global networks. *International Journal of Urban and Regional Research* 16, 4, pp.571–587.

Anderson B. 2003. The Rationales for Intellectual Property Rights: The Twenty-First Century Controversies. Paper presented at the DRUID Summer Conference, Copenhagen.

Ardichvili A, Cardozo R, Ray S. 2003. A theory of entrepreneurial opportunity identification and development. *Journal of Business Venturing* 18, pp.105-123.

Audretsch D, Grilo I, Thurik R. 2007. *Handbook of Research on Entrepreneurship Policy*. Edward Elgar: London.

Autio E. 1997. 'Atomistic' and 'Systemic' Approaches to Research on New Technology-based Firms: A Literature Study. *Small Business Economics* 9, 3.

Autio E, Kennedy M, Mustar P, Siegel D, Wright M. 2014. Entrepreneurial innovation: The importance of context. *Research Policy* 43, pp.1097-1108.

Babb EM, Babb SV. 1992. Psychological traits of rural entrepreneurs. *Journal of Socio-Economics* 21, pp.353–362.

Bandura A. 1997. *Self-efficacy: the exercise of self control*. Freeman: New York.

Baptista R, Swann P. 1998. Do firms in clusters innovate more? Research *Policy* 27, pp. 525–540.

Barney JB, Ketchen DJ, Wright M. 2011. The Future of Resource-Based Theory: Revitalization or Decline? *Journal of Management* 37, 5.

Barney JB. 1991. Firm resources and sustained competitive advantage. *Journal of Management* 17.

Baum RJ, Locke EA. 2004. The Relation of Traits, Competencies, Vision, Motivation, and Strategy to Venture Growth. *Journal of Applied Psychology* 4, pp. 587-598.

Berger PL, Luckmann T. 1967. *The social construction of reality: A treatise in the sociology of knowledge*. Anchor Books/Doubleday: Garden City, NY.

Bessant J, Tidd J. 2011. *Innovation and Entrepreneurship*. Wiley: Chichester.

Bhaskar R. 1975. *A realist theory of science*. Leeds Books: Leeds.

Bird B, West III GP. 1997. Time and entrepreneurship. *Entrepreneurship Theory and Practice* 22, pp. 5-9.

Bottazzi L, Peri G. 2003. Innovation and spillovers in regions: Evidence from European patent data. *European Economic Review* 47, pp. 687–710.

Braczyk HJ, Cooke P, Heidenreich M. (eds.). 1998. *Regional Innovation Systems: The Role of Governance in a Globalised World*. UCL: London and Pennsylvania.

Brajkovich LF. 1994. Sources of social structure in a start-up organization: work networks, work activities, and job status. *Social Networks* 16, 3, pp.191–212.

Brass DJ. 1992. Power in organizations: a social network perspective. *Research Policy* 4, pp. 295–323.

Breschi S, Malerba F, Orsenigo L. 2000. Technological Regimes and Schumpeterian Patterns of Innovation. *The Economic Journal* 110.

Brown JS, Duguid P. 1991. Organizational learning and communities-of-practice: toward a unified view of working, learning, and innovation. *Organization Science* 2, 1, pp.40– 57.

Burt RS. 1992. The social structure of competition. In *Networks and Organizations*, Nohria N, Eccles RG (eds.). pp.57-91.

Campbell DT. 1974. *Evolutionary epistemology*. In Schilpp PA (ed.)

Cantwell J, Fai F. 1999. Firms as the source of innovation and growth: the evolution of technological competence. *Journal of Evolutionary Economics* 9

Carlsson B, Stankiewicz R. 1991. On the nature, function and composition of technological systems. *Journal of Evolutionary Economics* 1, 2.

Carter NM, Gartner WB, Reynolds PD. 1996. Exploring start-up event sequences. *Journal of Business Venturing* 11, 3, pp.151-166.

Chesbrough H. 2003. *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business School Press: Boston.

Choi YR, Shepherd D. 2004. Entrepreneurs' decisions to exploit opportunities. *Journal of Management* 30, 3, pp. 377-395.

Collins C, Locke E, Hanges P. 2000. The relationship of need for achievement to entrepreneurial behavior: a meta-analysis. Working paper, University of Maryland, College Park, MD

Cooke P. 2002. *Knowledge Economies. Clusters, Learning and Cooperative Advantage*. Routledge: London.

Cooke P, Gomez Uranga M, Etxebarria G. 1997. Regional Systems of Innovation: Institutional and Organisational Dimensions. *Research Policy* 26.

Coombs R. 2001. *Technology and the Market: Demand, Users and Innovation*. Edward Elgar: Cheltenham, UK.

Cooper RG. 2005. *Product Leadership: Pathways to Profitable Innovation*, 2nd ed. Perseus Books: New York.

Corman J, Perles B, Vancini P. 1988. Motivational factors influencing high-technology entrepreneurship. *Journal of Small Business Management* 26, pp. 36–42.

Das TK, Teng BS. 1997. Time and entrepreneurial risk behavior. *Entrepreneurship Theory and Practice* 22, 2, pp. 69–88.

Davidsson P, Honig B. 2003. The role of social and human capital among nascent entrepreneurs. *Journal of Business Venturing* 18, 3, pp. 301–331.

Dimov D. 2007. Beyond the Single-Person, Single-Insight Attribution in Understanding Entrepreneurial Opportunities. *Entrepreneurship Theory & Practice* 31, 5, pp. 713-731.

Drucker P. 1970. Entrepreneurship in Business Enterprise. *Journal of Business Policy* 1.

Drucker P. 1985. *Entrepreneurship & Innovation*. Harper & Row: New York.

Edquist C. (ed.) 1997. *Systems of Innovation: Technologies, Institutions and Organizations*. Pinter/Cassell: London.

Eisenhardt K. 1989. Building Theories from Case Study Research. *Academy of Management Review* 14, 4, pp. 532-550.

Etzkowitz H, Webster A, Gebhardt C, Cantisano Terra BR. 2000. The future of the university and the university of the future: Evolution from ivory tower to entrepreneurial paradigm. *Research Policy* 29, 2.http://www.bbk.ac.uk/lib/elib

Fagerberg J, Mowery DC, Nelson RR. (eds.). 2005. *The Oxford Handbook of Innovation*. Oxford University Press: Oxford and New York.

Fagerberg J, Srholec M. 2008. National Innovation Systems, Capabilities and Economic Development. *Research Policy* 37, 9.

Feldman M, Francis J, Bercovitz J. 2005. Creating a cluster while building a firm: entrepreneurs and the formation of industrial clusters. *Regional Studies* 39, 1, pp.129–141.

Festinger L, Schachter S, Back KW. 1950. *Social Pressures in Informal Groups: A Study of Human Factors in Housing*. Harper: New York.

Flyvbjerg B. 2006. Five misunderstandings about case-study research. *Qualitative Inquiry* 12, 2, pp. 219-245.

Forbes DP, Borchert PS, Zellmer-Bruhn ME, Sapienza HJ. 2006. Entrepreneurial team foundation: an exploration of new member addition. *Entrepreneurship Theory & Practice* 30, pp. 225-248.

Foss NJ, Lyngsie J, Zahra SA. 2013. The role of external knowledge sources and organizational design in the process of opportunity exploitation. *Strategic Management Journal* 34, 12, pp. 1453-1471.

Fountain JE. 1998. Social capital: its relationship to innovation in science and technology. *Science and Public Policy* 25, 2, pp.103-115.

Freel MS. 2000. External linkages and product innovation in small manufacturing firms. *Entrepreneurship and Regional Development* 12, pp. 245–266.

Freel MS. 2003. Sectoral Patterns of small firm innovation, networking and proximity. *Research Policy* 32, pp.751-770.

Freeman C. 1982. *The economics of industrial innovation*. Pinter: London

Freeman C. 1987. *Technology and Economic Performance: Lessons from Japan*. Pinter: London

Freeman C. 1991. Networks of Innovators: a synthesis of research issues. *Research Policy* 20.

Freeman C. 1995. National System of Innovation in Historical Perspective. *Cambridge Journal of Economics* 19, 1.

Fusfeld H, Haklisch C. 1985. Cooperative R&D for competitors. *Harvard Business Review* Nov - Dec, pp.60-79.

Gartner WB. 1985. A conceptual framework for describing the phenomenon of new venture creation. *Academy of Management Review* 10, pp.696–706.

Gartner WB. 1988. 'Who is an entrepreneur?' is the wrong question. *American Journal of Small Business* 12, pp.11–32.

Gartner WB. 1995. Aspects of Organizational Emergence. In *Entrepreneurship: Perspectives on Theory Building*. Bull I, Thomas H, Willard G. (eds.).

Garud R, Gehman J, Guiliani AP. 2014. Contextualizing entrepreneurial innovation: A narrative perspective. *Research Policy* 43, pp.1177-1188.

Gibbons M, Limoges C, Nowotny H, Schwartzman S, Scott P, Trow M. 1994. *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. Sage Publications: London.

Godfrey PC, Hill CW. 1995. The problem of unobservables in strategic management research. *Strategic Management Journal* 16, 7, pp.519–533.http://moodle.bbk.ac.uk/

Godin B. 2009). National Innovation System: The System Approach in Historical Perspective. *Science, Technology and Human Values* 34, 4.

Granovetter M. 1973. The strength of weak ties. *American Journal of Sociology* 78, pp. 1360–1380.

Granstrand O, Patel P, Pavitt K. 1997. Multi-technology corporations: Why they have 'distributed' rather than 'distinctive core' competencies. *California Management Review* 39.

Greve A, Salaff JW. 2003. Social Networks and Entrepreneurship. *Entrepreneurship Theory & Practice* 28, pp.1–22.

Grimaldi R, Grandi A. 2005. Business Incubators and New Venture Creation: An Assessment of Incubating Models. *Technovation* 25, pp. 111-121.

Gustafsson R, Autio E. 2011. A failure trichotomy in knowledge exploration and exploitation. *Research Policy* 40, 6, pp.819–831.

Hagedoorn J. 1993. Understanding the rationale of strategic technology partnering: interorganizational modes of cooperation and sectoral differences. *Strategic Management Journal* 14.

Hagedoorn J, van Kranenburg H. 1993. Growth patterns in R&D partnerships: an exploratory statistical study. *International Journal of Industrial Organization* 21.

Hagedoorn J, Link AN, Vonortas NS. 2000. Research partnerships. *Research Policy* 29, pp. 567–586.

Hall BH, Rosenberg N. (eds.). 2010. *Handbook of The Economics of Innovation* Vol. 1. Elsevier: Oxford.

Hamel G, Doz Y, Prahalad CK. 1989. Collaborate with Your Competitors and Win. *Harvard Business Review* 67.

Hayek F. 1945. The Use of Knowledge in Society. *American Economic Review* 35, pp. 519-530.

Hills G, Lumpkin GT, Singh RP. 1997. Opportunity recognition: perceptions and behaviors of entrepreneurs. *Frontiers of Entrepreneurship Research*. Babson College, Wellesley, MA, pp.203 – 218.

Hjorth D, Jones C, Gartner WB. 2008. Recreating/Recontextualising Entrepreneurship. *Scandinavian Journal of Management* 21, pp. 81–84.

Hoang H, Antoncic B. 2003. Network-based research in entrepreneurship: A critical review. *Journal of Business Venturing* 18, pp.165-187.

Hornaday JA, Aboud, J. 1973. Characteristics of successful entrepreneurs. *Personnel Psychology* 24, pp.141–153.

Howells JR. 1997. Regional systems of innovation? In *Innovation Policy in a Global Economy*, Archibugi D, Howells J, Michie J. (eds.). Cambridge University Press: Cambridge.

Howells JR. 2002. Tacit Knowledge, Innovation and Economic Geography. *Urban Studies* 39, 5-6, pp. 871-884.

Howells JR. 2003. Systems of innovation in a global economy. In *The Handbook of Globalisation*, Michie J. (ed.). Edward Elgar: Cheltenham.

Howells J. 2006. Intermediation and the role of intermediaries in innovation. *Research Policy* 35, pp. 715-728.

Hung S, Whittington R. 2011. Agency in national innovation systems: Institutional entrepreneurship and the professionalization of Taiwanese IT. *Research Policy* 40, 4, pp. 526-538.

Johnson B, Lundvall B. 1993. Catching-up and institutional learning under post-socialism. In *Institutional Frameworks of Market Economies*, Hausner J, Jessop B, Neilsen K. (eds.). Avebury: Aldershot.

Kamm JB, Shyman JC, Seeger JA, Nurick AJ. 1990. Entrepreneurial teams in new venture creation: a research agenda. *Entrepreneurship Theory & Practice* 14, pp. 7-18.

Katz M. 1986. An analysis of cooperative research and development. *Rand Journal of Economics* 17.

Kilduff M, Brass DJ. 2010. Organizational Social Network Research: Core Ideas and Key Debates. *The Academy of Management Annals* 3, 1, pp. 315-317.

King N. 2004. Using interviews in qualitative research. In *Essential guide to qualitative methods in organizational research*, Cassell C, Symon G. (eds.). Sage: London.

Kirzner IM. 1973. *Competition and Entrepreneurship*. University of Chicago Press: Chicago.

Kirzner I. 1985. *Discovery and the Capitalist Process*. University of Chicago Press: Chicago.

Kline SJ, Rosenberg N. 1986. An overview of innovation. In *The Positive Sum Strategy: Harnessing Technology for Economic Growth*, Landau R, Rosenberg N. (eds.). National Academy Press: Washington, D.C.

Lam A. 2000. Tacit Knowledge, Organisational Learning and Societal Institutions: An Integrated Framework. *Organization Studies* 21, 3. http://www.bbk.ac.uk/lib/elib

Laredo P. 2007. Revisiting the Third Mission of Universities: Toward a Renewed Categorization of University Activities? *Higher Education Policy* 20.

Larson A. 1992. Network dyads in entrepreneurial settings: a study of the governance of exchange relations. *Administrative Science Quarterly* 37, pp. 76-104.

Lawton Smith H, Dickson K. 2003. Geo-Cultural Influences and Critical Factors in Inter-firm Collaboration. *International Journal of Technology Management* 25.

Leyden DP, Link AN, Siegel DS. 2013. A Theoretical Analysis of the Role of Social Networks in Entrepreneurship. *Research Policy* 43.

Low M, MacMillan I. 1988. Entrepreneurship: past research and future challenges. *Journal of Management* 14, pp.139–161.

Lundvall BA. 1992. *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. Pinter: London.

Lundvall BA, Borrás S. 2005. Innovation and Policy. In *The Oxford Handbook of Innovation*, Fagerberg J, Mowery DC, Nelson RR. (eds.). Oxford University Press: Oxford and New York.http://moodle.bbk.ac.uk/

Lundvall BA. 2007. National Innovation Systems - Analytical Concept and Development Tool. *Industry and Innovation* 14, 1.

Malerba F. 2002. Sectoral systems of innovation and production. *Research Policy* 31.

Malerba F. (ed.) 2004. *Sectoral Systems of Innovation. Concepts, Issues and Analyses of Six Major Sectors in Europe*. Cambridge University Press: Cambridge.

Marquis C, Battilana J. 2009. Acting globally but thinking locally? The enduring influence of local communities on organizations. *Research in Organizational Behaviour* 29, pp.283-302.

Maskell P, Eskelinen H, Hannibalsson I, Malmberg A, Vatne E. 1998. *Competitiveness, localised learning and regional development: Specialisation and prosperity in small open economies*. Routledge: London.

McClelland DC. 1961. *The Achieving Society*. Van Nostrand: New York.

McKelvey B. 1997. Quasi-natural organization science. *Organization Science* 8, 4, pp.352–380.

McMullen JS, Shepherd DA. 2006. Entrepreneurial Action and the Role of Uncertainty in the Theory of the Entrepreneur. *Academy of Management Review* 31, 1, pp.132–152.

Metcalfe S. 1995. The Economic Foundations of Technology Policy: Equilibrium and Evolutionary Perspectives. In *Handbook of the Economics of Innovation and Technological Change,* Stoneman P. (ed.). Blackwell: Oxford.

Metcalfe S, Ramlogan. 2008. Innovation systems and the competitive process in developing economies. *The Quarterly Review of Economics and Finance* 48, pp.433–446.

Miotti L, Sachwald F. 2003. Co-operative R&D: why and with whom? An integrated framework of analysis. *Research Policy* 32.http://www.bbk.ac.uk/lib/elib

Nanda R, Sorensen J. 2010. Workplace peers & entrepreneurship. *Management Science* 56, 7.

Nelson, R.R. (1992) National Innovation Systems: A Retrospective of a Study. Industrial and Corporate Change, Vol. 1 (2)

Nelson, R. (Ed.) (1993) National Innovation Systems. A Comparative Analysis. Oxford and New York: Oxford University Press

Nelson RR, Sampat BN. 2001. Making sense of institutions as a factor shaping economic performance. *Journal of Economic Behaviour & Organization* 44.

Nelson RR. 2008. What enables rapid economic progress: What are the needed institutions? *Research Policy* 37, 1.http://www.bbk.ac.uk/lib/elib

Nonaka I, Takeuchi H. 1995. *The Knowledge-Creating Company*. Oxford University Press: Oxford.

Nooteboom B. 1999. Innovation, learning and industrial organisation. *Cambridge Journal of Economics* 23, pp. 127–150.

Nooteboom B. 2000. Innovation and the Forms of Coordination in Innovation Systems. *Organization Studies* 21, 5.

Nooteboom B, Van Haverbeke W, Duysters G, Gilsing V, van den Ooord A. 2007. Optimal cognitive distance and absorptive capacity. *Research Policy* 36, pp. 1016-1034.

OECD. 1992. *Technology and the Economy. The Key Relationships*. OECD: Paris.

OECD. 1997. *National Innovation Systems*. OECD: Paris.

OECD. 2002. *Dynamising National Innovation Systems*. OECD, Part II: Paris.

Oerlemans L, Meeus M, Boekema F. 2001. Firm clustering and innovation: determinants and effects. *Papers in Regional Science* 80, pp. 337–356.

Oliver AL, Liebeskind JP. 1998. Three levels of networking for sourcing intellectual capital in biotechnology: implications for studying inter-organisational networks. *International Studies of Management and Organization* 27, 4, pp. 76–103.

Patel P, Pavitt K. 1994. The Nature and Economic Importance of National Innovation Systems. *STI Review* 14. OECD: Paris.

Pavitt K. 1984. Sectoral patterns of technical change: Towards a taxonomy and a theory. *Research Policy* 13, 6.

Perkmann, Walsh. 2007. University-industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews* 9, 4, pp. 259-280.

Pisano GP, Verganti R. 2008. Which kind of collaboration is right for you? *Harvard Business Review* December 86, 12, pp. 78-86.

Podolny JM, Page KL. 1998. Network Forms of Organization. *Annual Review of Sociology* 24, pp. 57-76.

Polanyi M. 1966. *The Tacit Dimension*. Routledge: London.

Porter M.E. 1990. *The Competitive Advantages of Nations*. The Free Press: New York.

Prahalad CK, Hamel G. 1990. The Core Competence of the Corporation. *Harvard Business Review*, pp. 79-91.

Pruitt DG. 1981. *Negotiation Behavior*. Academic Press: New York.

Radosevic S. 2007. National Systems of Innovation and Entrepreneurship: In Search of a Missing Link. University College London, *Centre for the Study of Economic and Social Change in Europe: Economic Working Paper* 73.

Ragin CC, Becker HS. 1992. What is a case? Exploring the foundations of social inquiry. Cambridge University Press: Cambridge, New York.

Ramoglou S. 2013. On the misuse of realism in the study of entrepreneurship. *Academy of Management Review* 38, 3, pp. 463-465.

Ramoglou S, Zyglidopoulos. 2015. The constructivist view of entrepreneurial opportunities: a critical analysis. *Small Business Economy* 44, pp. 71-78.

Rogers E. 1995. *Diffusion of Innovations*. 4th edn. The Free Press: New York.

Rosenkopf L, Almeida P. 2003. Overcoming local search through alliances and mobility. *Management Science* 49.

Rotter JB. 1966. Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied 80*, 609.

Sakakibara M. 2001. Cooperative research and development: who participates and in which industries do projects take place? *Research Policy* 30, pp. 993-1018.

Sarasvathy S. 2001. Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency. *The Academy of Management Review* 26, 2, pp. 243-263.

Sarasvathy SD. 2008. *Effectuation: Elements of entrepreneurial expertise*. Edward Elgar: Cheltenham, UK.

Sarasvathy SD, Venkataraman S. 2011. Entrepreneurship as method: Open questions for an entrepreneurial future. *Entrepreneurship Theory and Practice* 35, 1, pp.113-135.

Sayer A. 2000. *Realism and social science*. Sage: London.

Schumpeter JA. 1934. *The Theory of Economic Development* (trans. Redvers Opie). Harvard University Press: Cambridge.

Schumpeter JA. 1942. *Capitalism, Socialism and Democracy*. 4th edn. Unwin University Press: London.

Shane S. 1999. Prior Knowledge and the Discovery of Entrepreneurial Opportunities. *Organization Science* 11, 4, pp. 448-469.

Shane S. 2003. *A General Theory of Entrepreneurship: The Individual Opportunity Nexus*. Edward Elgar: Cheltenham, UK.

Shane S. 2011. Reflections on the 2010 AMR decade award: Delivering on the promise of entrepreneurship as a field of research. *Academy of Management Review* 37, 1, pp. 10–20.

Shane S, Locke EA, Collins CJ. 2003. Entrepreneurial motivation. *Human Resource Management Review* 13, pp. 257-279.

Shane S, Venkataraman S. 2000. The Promise of Entrepreneurship as a Field of Research. *Academy of Management Review* 25, 1, pp. 217-226.

Shane S, Venkataraman S. 2001. Entrepreneurship as a field of research: A response to Zahra and Dess, Singh, and Erikson. *Academy of Management Review* 26, 1, pp. 13–16.

Sharif N. 2006. Emergence and development of the National Innovation Systems concept. *Research Policy* 35, 5.

Short JC, Ketchen DJ, Shook CL, Ireland RD. 2010. The Concept of 'Opportunity' in Entrepreneurship Research: Past Accomplishments and Future Challenges. *Journal of Management* 36, 1, pp. 40-65.

Sigrist B. 1999. Entrepreneurial opportunity recognition. A presentation at the Annual UIC/AMA symposium at Marketing/Entrepreneurship Interface, Sofia-Antipolis, France.

Small ML. 2009. How many cases do I need? On science and the logic of case selection in field-based research. *Ethnography* 10, 1, pp. 5-38.

Smith K. 1995. Interactions in Knowledge Systems: Foundations, Policy Implications and Empirical Methods. *STI Review* 16.

Sørensen JB. 2007. Bureaucracy and Entrepreneurship: Workplace Effects on Entrepreneurial Entry. *Administrative Science Quarterly* 52, pp. 387-412.

Stuart TE, Sorenson O. 2005. Social networks and entrepreneurship. In *Handbook of Entrepreneurship,* Agrawal R, Alvarez S, Sorenson O. (eds.). Springer-Verlag: Berlin.

Teece DJ. 1992. Competition, cooperation and innovation: organisational arrangements for regimes of rapid technological progress. *Journal of Economic Behaviour and Organization* 18.

Tether BS. 2002. Who co-operates for innovation, and why: An empirical analysis. *Research Policy* 31.

Thornton PH. 1999. The sociology of entrepreneurship. *Annual Review of Sociology* 25, pp. 19–46.

Thornton PH, Flynn KH. 2003. Entrepreneurship, Networks, and Geographies. In *Handbook of Entrepreneurship Research*, Acs ZJ, Audretsch DB. (eds.). Kluwer Law International: Great Britain.

Tödtling F, Trippl L. 2005. One Size Fits All? Towards a differentiated regional innovation policy approach. *Research Policy* 34, pp. 1203-1209.

Ulhøi JP. 2005. The social dimensions of entrepreneurship. *Technovation* 25, pp. 939-946.

Utterback, J. & Abernathy, W. (1975) A dynamic model of process and product innovation. Omega, Vol. 3.

Venkataraman S. 2002. The Distinctive Domain of Entrepreneurship Research. In *Foundations of Entrepreneurship*, Shane S. (ed.). Edward Elgar: London.

Veugelers R. 1997. Internal R&D expenditures and external technology sourcing. *Research Policy* 26, pp. 303-315.

von Hippel E. 1988. *The Sources of Innovation*. Oxford University Press: Oxford.

von Hippel E. 1994. 'Sticky information' and the locus of problem solving: implications for innovation. *Managerial Science* 40, 4, pp. 429–439.

Wasserman S, Faust K. 1994. *Social Network Analysis*. Cambridge University Press: Cambridge.

Welter F. 2011. Contextualising Entrepreneurship - Conceptual Challenges and Ways Forward. *Entrepreneurship Theory & Practice* 35, 1, pp. 1042-2587.

Wernerfelt B. 1984. A resource-based view of the firm. *Strategic Management Journal* 5.

Westhead P, Wright M, McElwee G. 2011. *Entrepreneurship: Perspectives and cases*. Pearson: London.

Whetten DA. 1989. What constitutes a theoretical contribution? *Academy of Management Review* 14, 4, pp. 490–495.

Wood MS, McKinley W. 2010. The production of entrepreneurial opportunity: A constructivist perspective. *Strategic Entrepreneurship Journal* 4, 1, pp. 66–84.

Woolthuis RK, Lankhuizen M, Gilsing V. 2005. A system failure framework for innovation policy design. *Technovation* 25, pp. 609-619.

Xheneti M, Blackburn R. 2011. Small business and entrepreneurship: An analysis of publications and implications for the development of the field. In *Challenges and Controversies in Management Research*, Cassell C, Lee B. (eds.). Routledge: New York.

Yin RK. 2003. *Case study research: Design and methods*. 3rd edn. Sage: Thousand Oaks, CA.

Zahra SA. 2007. Contextualizing theory building in entrepreneurship research. *Journal of Business Venturing* 22, 3, pp. 443-452.

Zahra SA. 2008. The virtuous cycle of discovery and creation of entrepreneurial opportunities. *Strategic Entrepreneurship Journal* 2, 3, pp. 243–258.

Zahra SA, Ireland RD, Hitt MA. 2000. International expansion by new venture firms: International diversity, mode of market entry, technological learning, and performance. *Academy of Management Journal* 43, 5, pp. 925-950.

Zahra SA, Wright M. 2011. Entrepreneurship's Next Act. *Academy of Management Perspectives* 25, 4, pp. 67-83.

Zahra SA, Wright M, Abdelgawad S. 2014. Contextualization and the advancement of entrepreneurship research. *International Small Business Journal* 32, 5.

Zolin R, Kuckertz A, Kautonen T. 2011. Human Resource Flexibility and strong ties in entrepreneurial teams. *Journal of Business Research* 64, pp. 1097-1103.

Zucker LG, Darby MR. 1996. Star scientists and institutional transformation: patterns of invention and innovation in the formation of the biotechnology industry. *Proceedings of the National Academy of Sciences* 93, pp. 12709–12716.

Appendix A: Interconnectivity in the Extended Project Network

Fig. A